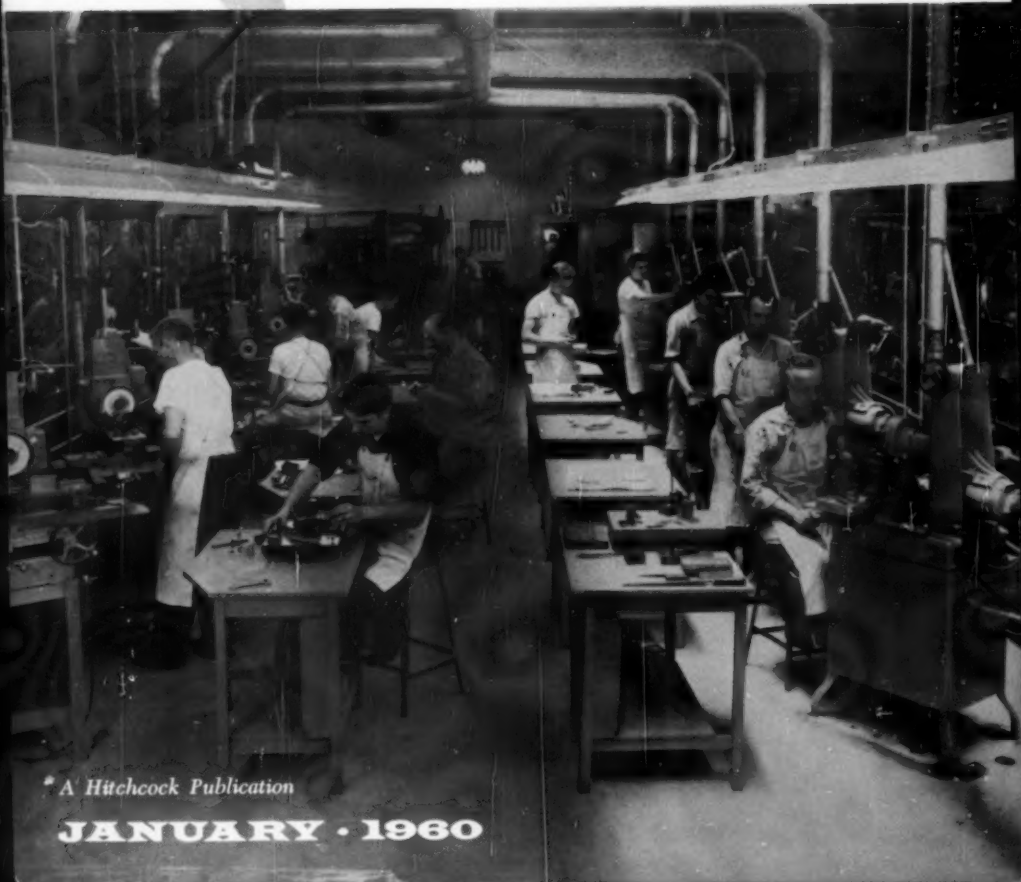


Machine and Tool **BLUE BOOK**



**Design Hints
for Successful
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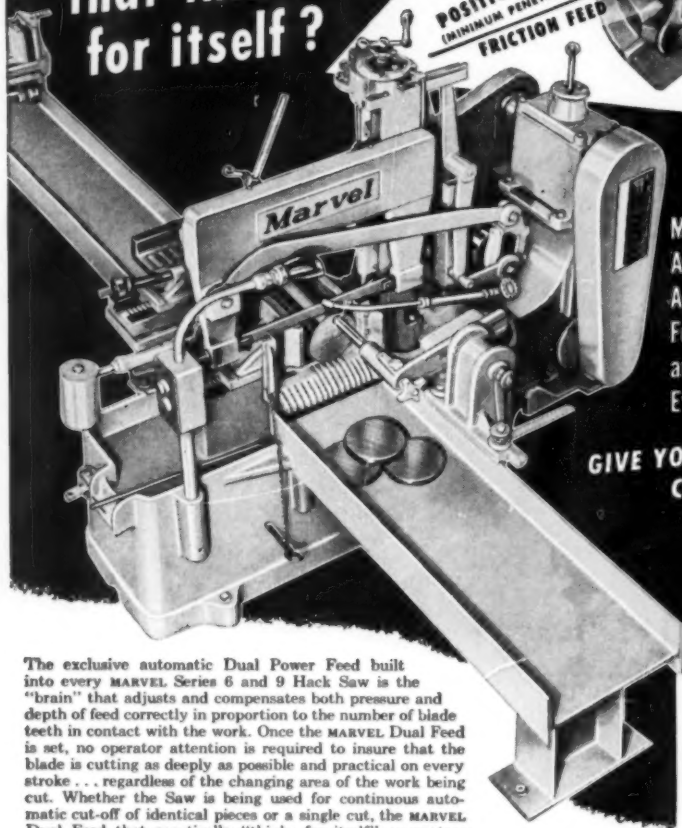
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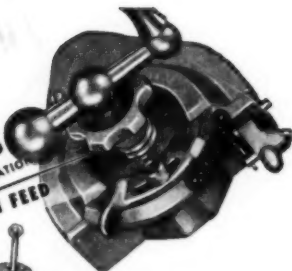
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JANUARY • 1960

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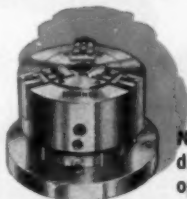
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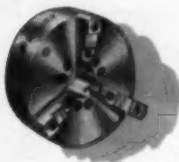
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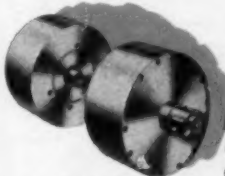
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January, 1960

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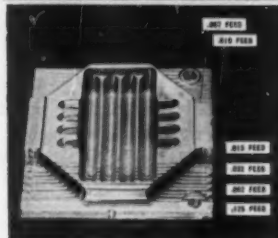
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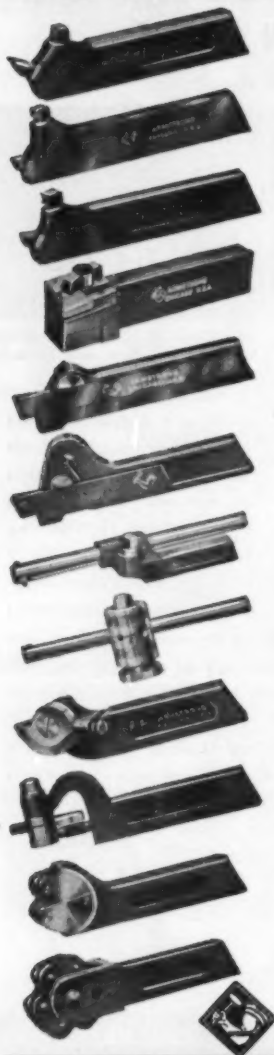
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MACHINE and TOOL BLUE BOOK

JANUARY, 1960

Machine and Tool BLUE BOOK

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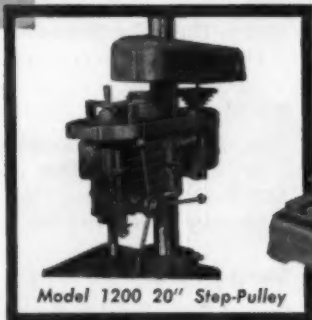


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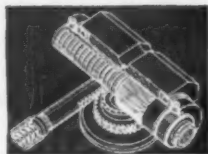
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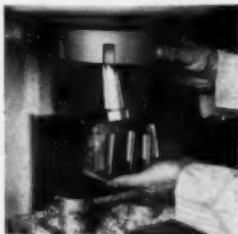
No other medium-duty knee type milling machine combines so many toolroom feature-advantages with the production possibilities of automatic reciprocating table cycles. May we give you more information? Ask for catalog No. M-1995-3, or a visit by one of our field men.



Automatic Backlash Eliminator operates without attention. There is always a snug fit between feed screw and nut for "climb" milling.



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PLAIN	203-10 ML	3	28"
	205-10 MI	5	28"
	307-14 MI	7½	34"
	410-14 MI	10	42"
UNIVERSAL	203-10 ML	3	28"
	205-10 MI	5	28"
	307-14 MI	7½	34"
	410-14 MI	10	42"
VERTICAL	205-10 MI	5	28"

Catalog No. M-1995-3

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MILLING MACHINE DIVISION

UTTER AND TOOL GRINDERS • ELECTRICAL DISCHARGE MACHINES

TREE RAPID-LOK COLLET ADAPTER

1



Unlocked position •
In this position tools are inserted or removed.

2



Locked position •
Handle is moved upward as shown to lock tools securely. Desired locking pressure obtained by nose adjustment.

3



Working position •
Tool now securely held in position—handle removed.



EXCLUSIVE TREE FEATURE

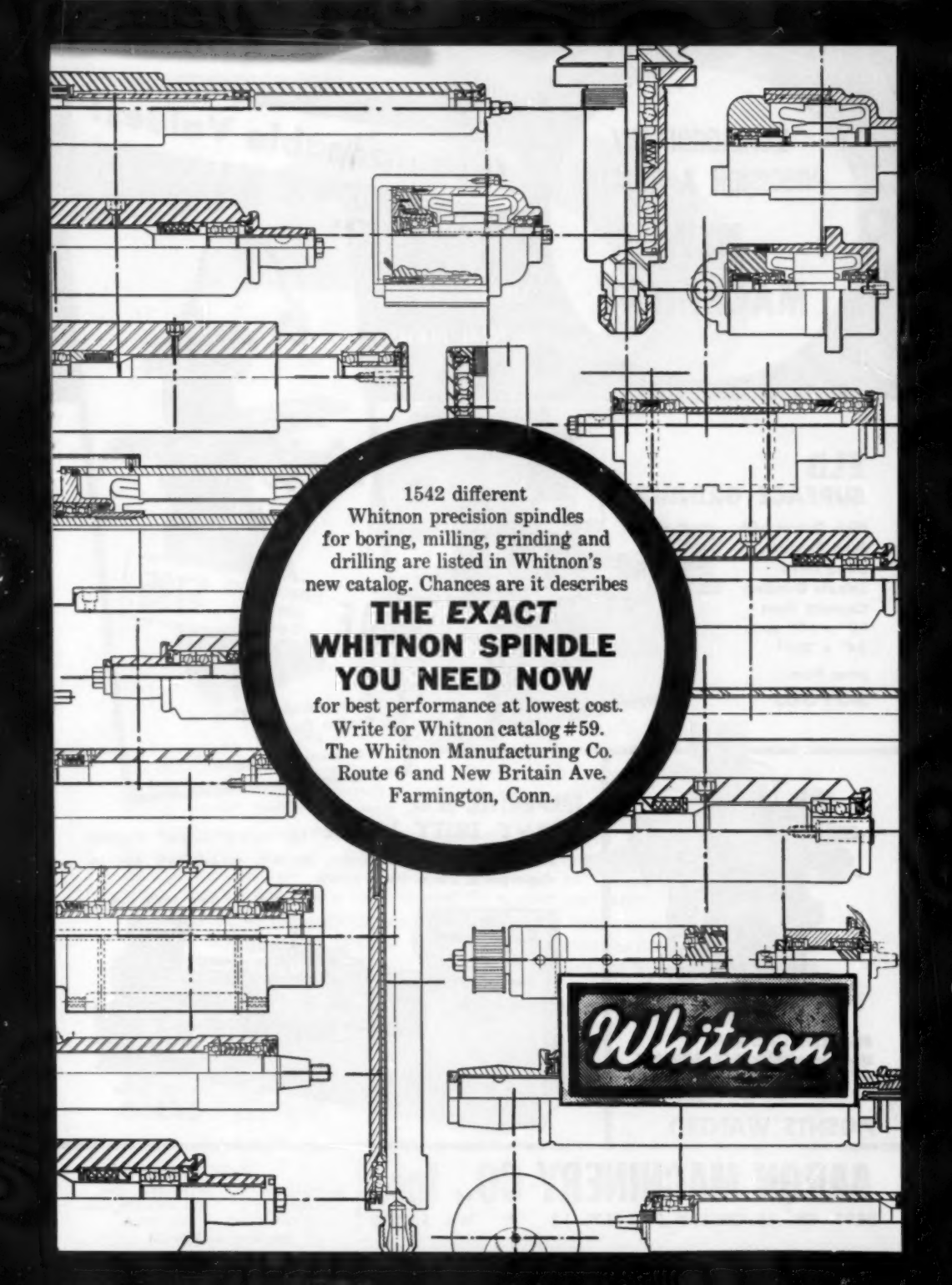
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It is an adaptation of an exclusive feature which has been proved in use on Tree milling machines over a period of years.



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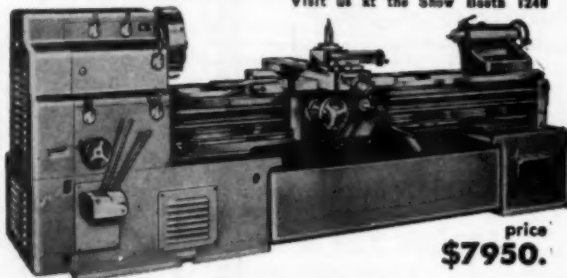
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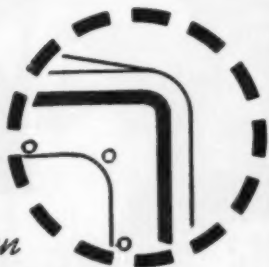
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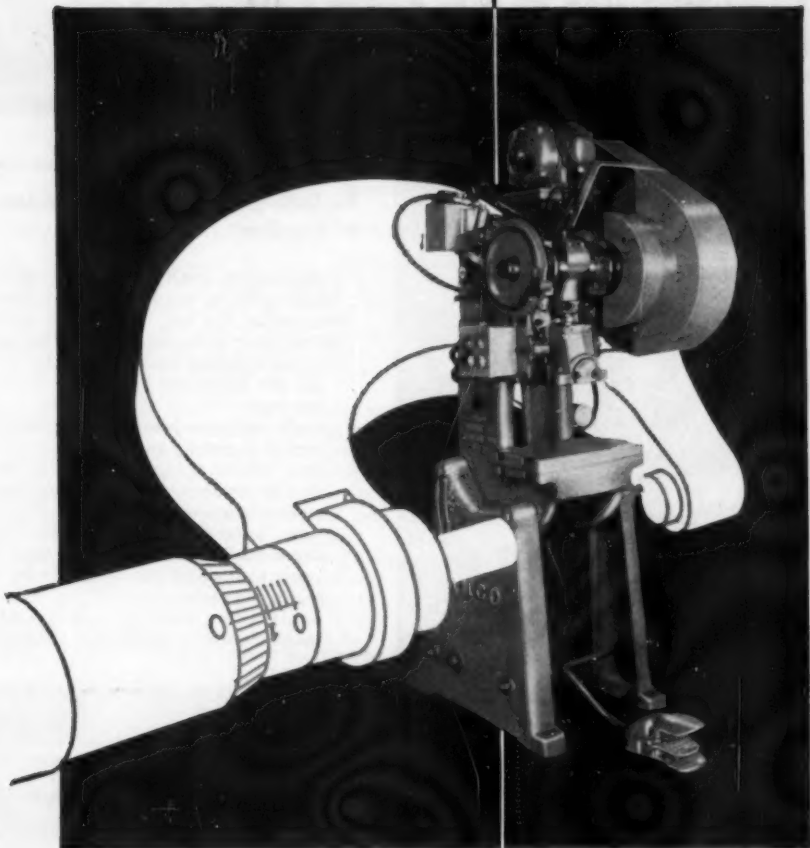


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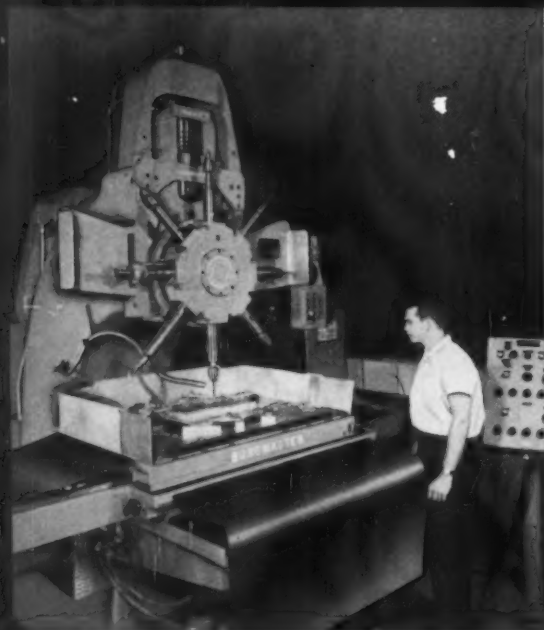
Tool Savings on Small Lots During **BURGMASTER** *tape controlled*

Maximum Flexible Automation ---

for Drilling, Boring and Tapping Lots of Any Size

At Rocketdyne, small lots are no limitation for using the automatic Tape Controlled Burgmaster. The fact is, small lots point out the basic advantages of Tape Control for close tolerance hole operations.

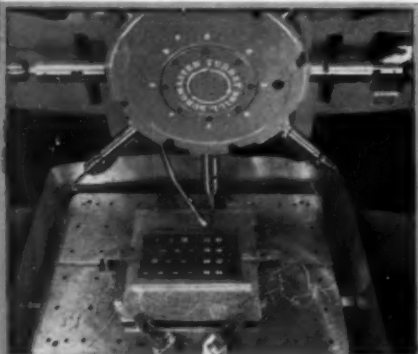
- jigs are eliminated and simple clamps are used.
- costly tool room procedures for special tooling is greatly minimized.
- lead time is reduced because of less time to program, prepare a tape, and make a machine set-up.
- surer, faster production is assured because the Burgmaster is automatically tape controlled for fast, accurate machining cycles.
- engineering changes are quickly accomplished by simple tape changes.



Speed Production, Cut Costs of Experimental or R & D Parts.

Less time, from the drawing board to the finished part—this is the simple formula that works to your advantage when producing lots of any size with the tape controlled Burgmaster Turret Drilling Machine.

268 operations on 100 holes are produced 8 times faster on this Rocket Instrumentation Panel. During machining, one tool change is made on two spindles. Note the simple holding clamps.



World's Largest Builder of Turret Drilling Machines



10" Manual
Power Index
8" Capacity



1C Manual
Power Index
9 1/2" Capacity



28 Manual
Power Index
9 1/2" Capacity



28F Flange Mounted
Power Index
9 1/2" Capacity



28H Automatic
Hydraulic
3 1/2" Capacity



30H Automatic
Hydraulic
1 1/2" Capacity



28B Run Type
Radial Drill
9 1/2" Capacity



28MT-28MT Automatic
Tape Controlled
3 1/2" and 1 1/2" Capacity

1 Year Will Pay for \$68,000.00

8 SPINDLE TURRET DRILL

Tool savings alone will pay for a \$68,000 Tape Controlled Burgmaster Turret Drilling, Tapping and Boring Machine within a year, while producing small lots from 3 to 5 parts. In addition, the machine is producing up to 8 times more parts compared to conventional machining methods.

Time is the vital element in producing Research and Development hardware and production at Rocketdyne moves fast in order that parts in process will reflect improvements determined by latest tests. The tape controlled Burgmaster is an answer to getting into production fast and making engineering changes rapidly and inexpensively.

Parts are clamped on the 30" x 45" positioning table using an aluminum sub-base and simple clamps instead of expensive tooling with drill bushings. Table positioning is 180° per minute, being automatically controlled by tape to accurately locate the work on two axis for each setting simultaneously. The tape also controls the selection of proper spindle sequence and all machine functions. In addition, all standard adjustable Burgmaster controls are maintained including pre-selective spindle speeds, infinitely variable pre-selective temperature compensated

feeds, selective rapid approach and return.

There is a Burg representative or dealer near you that will supply all the facts — call him at no obligation.

Job Facts

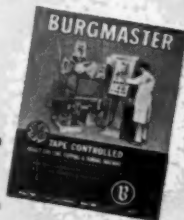
Machine:	Burgmaster 38BT 8-Spindle Turret Drilling, Tapping and Boring Machine with 30" x 45" Positioning Table and CE Tape Controls.
Company:	Rocketdyne, a Division of North American Aviation, Inc., Canoga Park, California.
Part:	Rocket Instrumentation Panel.
Material:	1020 steel plate, 1/4" x 9" x 18".
Operations:	Centerdrill and drill 100 holes, tap 68 holes: a total of 268 operations.
Holding:	Standard clamps.
Quantity:	Five parts.
Accuracy:	Table positioning to $\pm .001$ ".
Former Method:	Line of single spindle drills using drill jig.
Former Time:	One part per day.
Present Time:	Eight parts per day.
Advantages:	Increased production 8 to 1, lead time drastically reduced, tool saving alone will approximately pay for \$68,000.00 Burgmaster Machine within a year.

SEQUENCE OF 268 MACHINING OPERATIONS

Spindle No.	Tool	No. of Holes	Speed	Feed
1	No. 1 Centerdrill	72	2400	.003
4	No. 4 Centerdrill	28	2400	.003
2	.159 Drill	52	1540	.005
6	Tap 10-32NF-38 Tapmatic Head	52	330	.031
7	.136 Drill	16	2400	.003
3	Tap 8-32NC-38 Tapmatic Head	16	330	.031
5	1.06 Drill	10	490	.003
8	.75 Drill	11	770	.003
1*	.406 Drill	7	1200	.004
4	.218 Drill	4	2400	.004

*NOTE: Tools are changed on spindles No. 1 and No. 4 after a programmed machine stop.

Write for Bulletin describing Burgmaster 6 and 8 spindle Tape Controlled Turret Drilling, Tapping and Boring Machines. See Burgmaster Machines in action: Thirty-minute 16mm sound film showing all Burgmaster Turret Drills in operation is available from any Burg office without charge.



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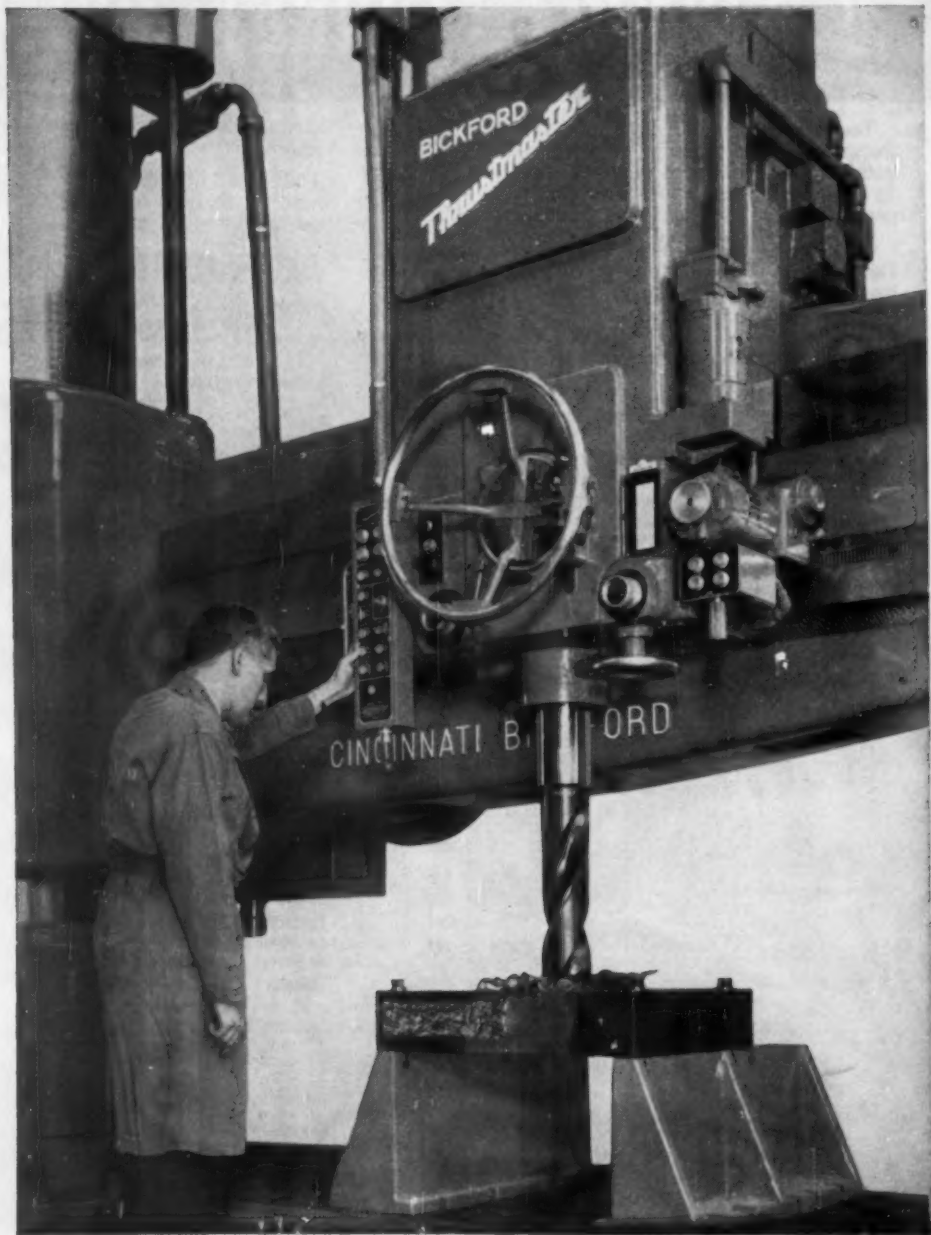
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Look at these chips made during demonstration of the Thrustmaster.

Feed: .067" per revolution at 105 RPM

Drill: Regular Morse Taper Shank Drill (style 1302) driven in solid steel.



Morse CUTTING TOOLS

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NEW BEDFORD, MASSACHUSETTS

WAREHOUSES IN NEW YORK, CHICAGO, DETROIT, DALLAS, SAN FRANCISCO

A Division of VAN NORMAN INDUSTRIES, INC. 

MORSE means "THE MOST" in Cutting Tools

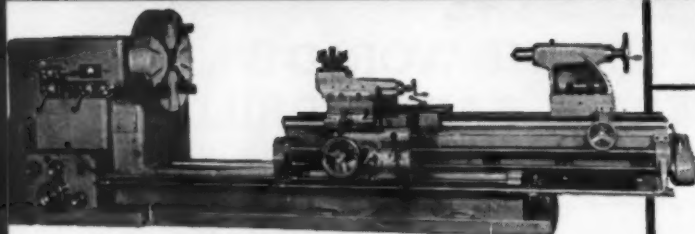
Ⓢ 6120

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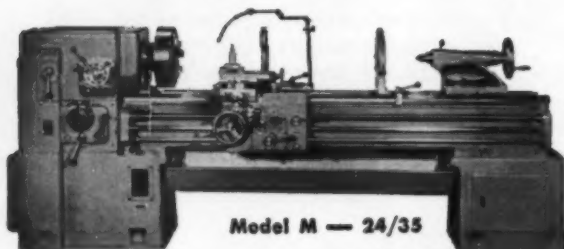
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FROM 12" SWING TO 200" SWING
30" CENTERS UP TO 300" CENTERS

**LIBERAL TERMS
RENTAL PLANS**



Model PS — 34/61



Model M — 24/35

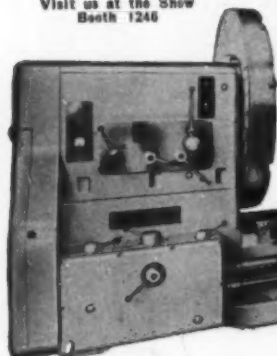
Flame hardened, ground bed ways.
Heat-hardened gears throughout.
Precision roller spindle bearings.

Sizes in inches	Basic Price
12x40	\$ 1393.
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16x40	\$ 2084.
18x40	\$ 3447.
20x40	\$ 3647.
24x40	\$ 8220.
31x40	\$ 9790.
34/62 sliding bed x 60	\$13790.
34x60	\$11180.
45x57	\$16980.
67x57	\$21280.

Extra large holes through
the spindles up to 13 1/2"

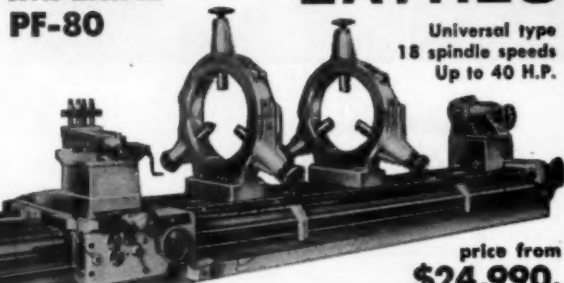
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MISSILE IMPERIAL PF-80

Universal type
18 spindle speeds
Up to 40 H.P.



price from
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LONGER LIFE AND
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Metal Cutting Band Saw

Here's a tough, edge-holding band saw blade that gives a real bonus in smooth, fast cutting and long life. Made of rugged, wear-resistant alloy steel, Simonds "Bonus" Band Saws have sharp, perfectly formed teeth that are set with absolute evenness on both sides of the blade. Hardened along the tooth edge only by scientifically controlled heat treatment, they combine maximum cut-ability with flexibility and resistance to breakage. They have an enviable reputation for dependable, trouble-free service. All standard widths, tooth styles and spacings are available from stock in coils or welded-to-length for all makes and types of band saw machines.

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For Every Need:

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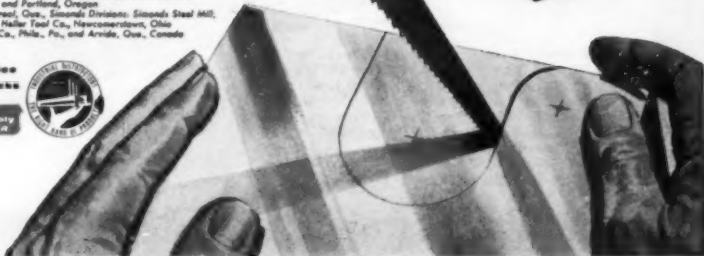
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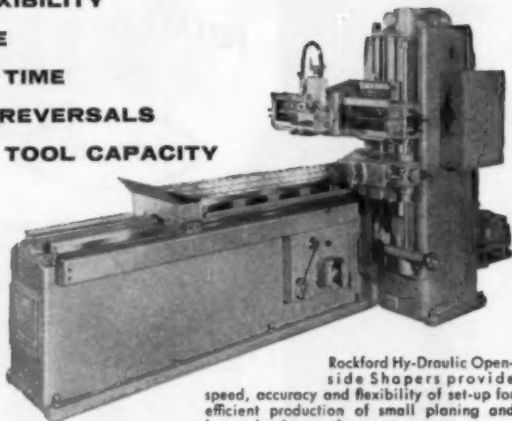
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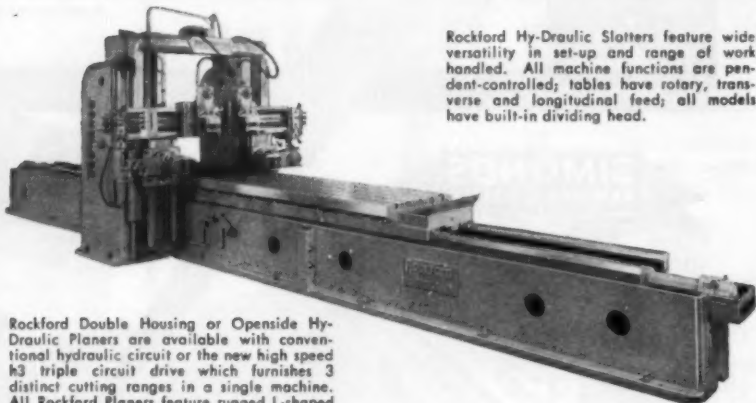
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Rockford Hy-Draulic Openside Shapers provide speed, accuracy and flexibility of set-up for efficient production of small planing and large shaping work.



Rockford Double Housing or Openside Hy-Draulic Planers are available with conventional hydraulic circuit or the new high speed h3 triple circuit drive which furnishes 3 distinct cutting ranges in a single machine. All Rockford Planers feature rugged L-shaped rail, pendant-control of set-up and operating functions, and infinitely adjustable hydraulic feeds and speeds.

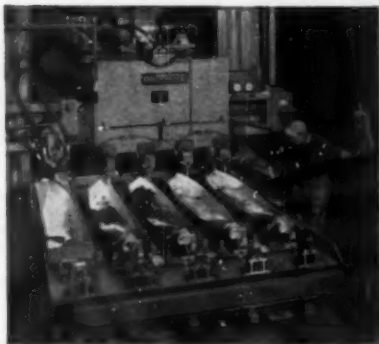
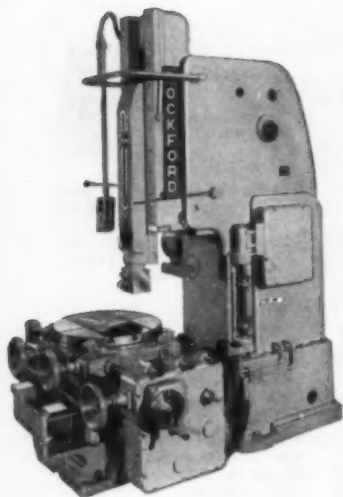
Rockford Hy-Draulic Slotters feature wide versatility in set-up and range of work handled. All machine functions are pendant-controlled; tables have rotary, transverse and longitudinal feed; all models have built-in dividing head.

Hydraulic drive and feeds, as basic features of Rockford Hydraulic Machine Tools, provide outstanding performance measured in terms of work quality, high production and low operating cost. They also provide cushioning action essential to use of modern carbide tools.

do you get these advantages!

Today, many metal-cutting operations are performed effortlessly, at low cost, and high production rates on Rockford Hy-Draulic machines. Hydraulic control and power respond instantly so that inexperienced operators easily adapt infinite speeds and feeds to the most complex and accurate machining cuts.

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FOR BIG, ^{HEAVY}DUTY PRECISION SPINDLES

that produce **BIG** savings in production cost

SPECIFY POPE



POPE P-18670 Heavy Duty, High Speed Milling Spindle, 4 ft. long, 10 in. dia.; weight about 1000 lbs.



POPE P-18842 Deep Hole Internal Grinding Spindle, 10 HP, 7 ft. long, 12 in. dia. barrel; weight 4000 lbs.



POPE P-5794B Motorized Deep Hole Grinding Spindle, 10 HP, 36 in. long, 6 in. dia. barrel, for use in horizontal or vertical position on boring mills or planers; weight about 800 lbs.



POPE P-18844 Vertical Bearing Grinder Spindle, 20 HP, 6 ft. long, 12 in. dia. barrel; weight approx. 4000 lbs.



POPE P-1098 Heavy Duty Internal and External Grinding Spindle, 50 HP, for wheel of 30 in. dia. and 12 in. width; weight approx. 6000 lbs.



POPE P-10009E Motorized Deep Hole Grinding Spindle, 5 HP, 36 in. long, 5 in. dia. barrel; weight 600 lbs.



POPE P-1076 Cylindrical Grinding Spindle, designed for crush dressing and form grinding; 5 ft. long, 10 in. dia. barrel, for 24 in. dia.; 4 in. wide wheel; weight about 1250 lbs.



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Send us your specifications and get prompt quotations on the one best Spindle for your work, out of the 20,000 different Precision Spindles that bear the name "POPE".

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654-C

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

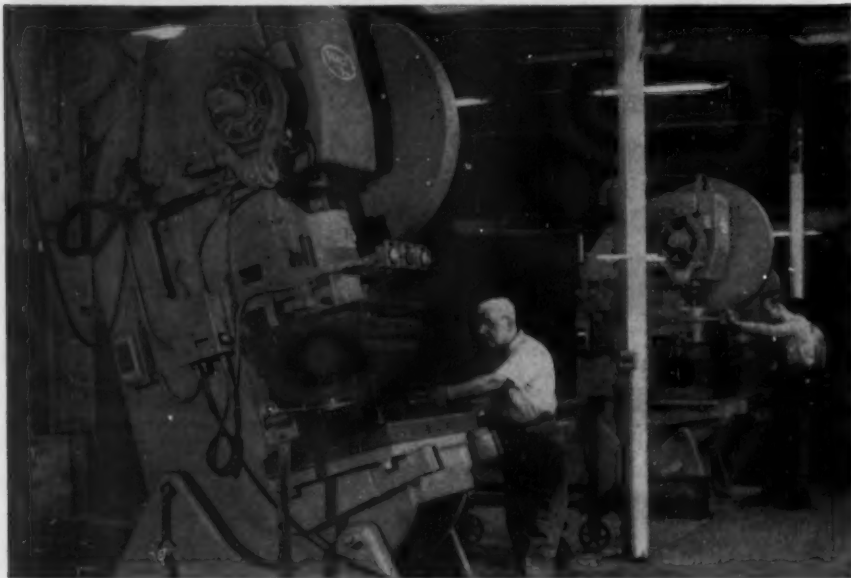
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Danly O.B.I. and gap frame presses have been setting remarkable performance records in the nation's largest press rooms for many years. Now this same Danly custom quality is available in a complete, standardized O.B.I. line, in capacities from 25 to 200 tons.

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AXIAL RELIEF

ANY COMBINATION
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①

R-O relieved tools last longer, give more cuts per grind. Better support for edge and direction of grind reduces tendency for tooth to burn.

②

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③

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④

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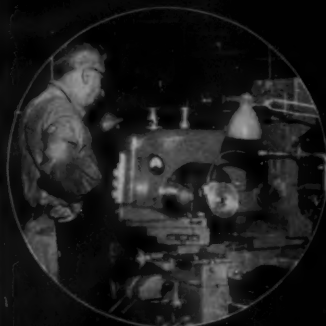
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reports
Reaction Motors Division
Thiokol Chemical Corporation



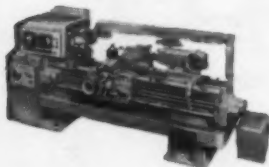
Inserting flat template in Copymatic prior to machining blank already chucked in lathe.

LATHE: 16" Powerturn
90° COPYMATIC 54" centers
CUSTOMER: Reaction Motors
Division of Thiokol Chemical Corp.
ADDRESS: Denville, New Jersey
DISTRIBUTOR:
Harrington-Wilson-Daum Corp.,
Mt. Vernon, New York
WORKPIECE:
Rocket Motor Nozzle
MATERIAL: 347 stainless steel
CUTTING TOOLS: High speed steel
OPERATION:
Contour turning and boring
TIME:
Machining 6 hours
Handling 1 hour
Floor-to-floor 7 hours
RESULTS: 63% savings in time
DATA BY:
P. Meccarelli, Gen. Foreman



Contour turning the exterior of the rocket motor nozzle. Note finished pieces on headstock.

by this Lodge & Shipley Powerturn Copymatic Lathe



More than ever before, your LODGE-ical choice . . .

Lodge & Shipley

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Reaction Motors Division of Thiokol Chemical Corp., Denville, N. J., plays an important part in America's rocket programs. In contour turning and boring a typical reaction motor nozzle, a Lodge & Shipley POWERTURN COPYMATIC Lathe cuts 12 hours from the previous time, completing the job in just 7 hours, floor-to-floor.


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The Lodge & Shipley Co., 8074 Colerain Ave., Cincinnati 25, Ohio

what's in a name?


Your name  gives you identity.


A tool has a "name"  a part has

a "name"  a switch has a "name"



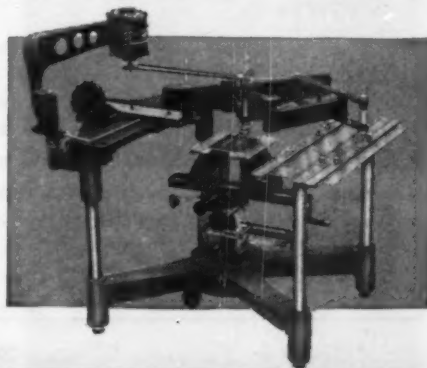
Everything in your plant has a

name, from  who works for you to

the  Engrave all these "names"

permanently with
unskilled labor by

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graph



Send for booklet MM3

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FEATURES:

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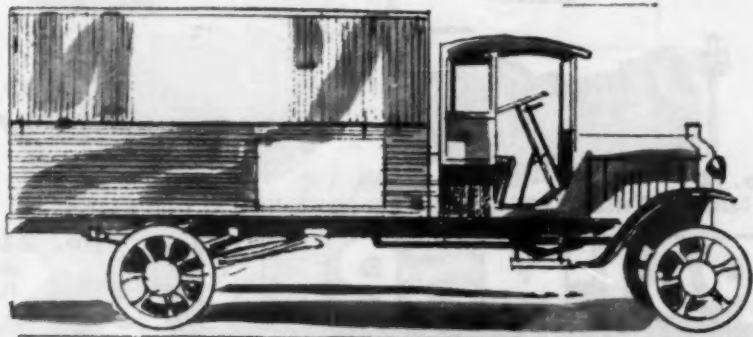
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Elkhart, Indiana

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Ask your Gisholt Representative about Gisholt Ram and Saddle Type Turret Lathes — how they can be put to work in your plant earning extra profits, paying for themselves. Call him today or write for literature.

GISHOLT

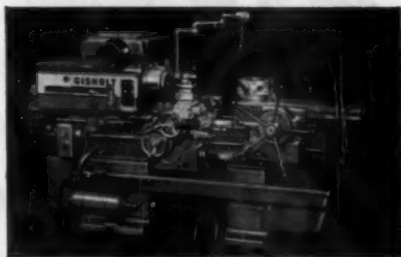
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Madison 10, Wisconsin

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Gisholt Ram Type Turret Lathe



Gisholt Saddle Type Turret Lathe

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\$34.95



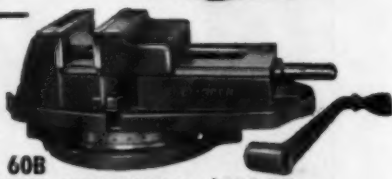
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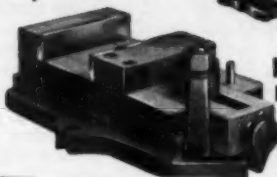
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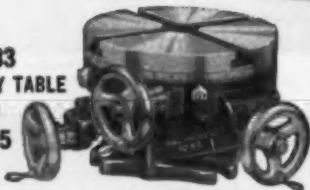
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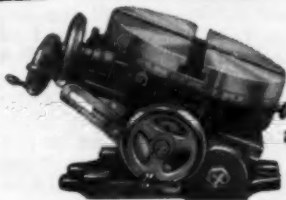
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784

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Approx. \$78.40

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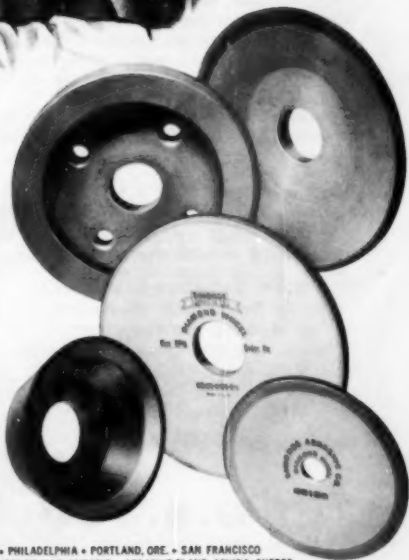
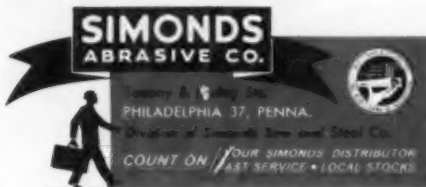
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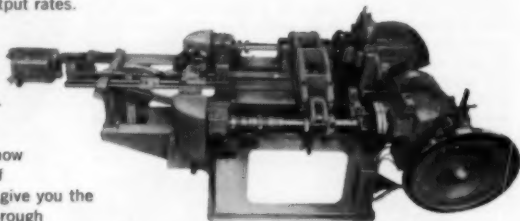
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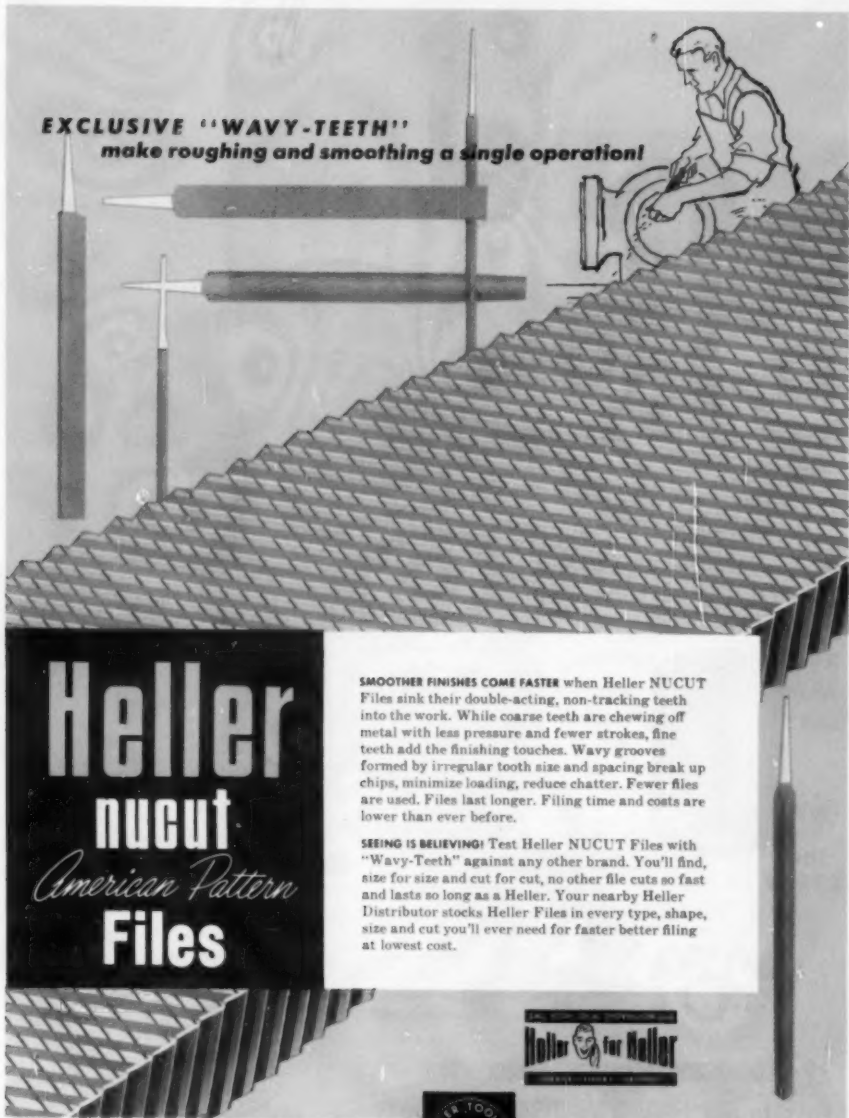
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January, 1960

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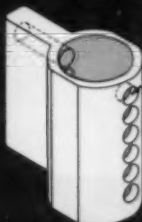


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1 INCH DEEP
LOCATE TO
±.001 WITH
BUSHINGS IN
PLUG

SECOND CHUCKING

(IN NEST
— NO CLAMPING)



G BROACH SLOT
H COMBINATION
BURR REAM
& FACE
J DEBURR
& PIN HOLES



Kingsbury machine cuts handling, makes big savings on Dexter locks

"Too much handling of lock parts causes nicking and burring. Then the assembled locks bind and we have to rework them," says Dexter Industries, Inc., of Grand Rapids, Michigan.

"Our new Kingsbury has cut our handling way down, eliminating nicks and increasing production by combining several operations in two chuckings of the work. We're delighted with it."

Each part passes twice around the machine. In the first chucking horizontal units at six stations drill the six pin holes, locating within .001. In the second chucking vertical units operate a broach and a combination tool. The last operation deburrs the pin holes; an air cylinder pushes removable pins on a block into the six pin holes.

Typical of what we can do for you. This setup resulted from the joint efforts of our sales engineers and representatives with Dexter's engineers and production men.

If you have drilling type operations in high production, may we make a proposal? Your Kingsbury will have good basic design and accurate rugged construction. It will be ready to produce when you receive it and will keep on producing. Kingsbury Machine Tool Corp., Keene, N. H.

KINGSBURY MULTI-UNIT
AUTOMATICS

...they all
prefer **PRODUCTO**
die sets

DIE MAKERS

like the amazing speed and ease of "take-apart and put-together" made possible by Quick-Fit Guide Pins. (Saler handling, too.)

DIE DESIGNERS

appreciate the unlimited selection of die sets which accommodate any type of die design.

PRESSROOM FOREMEN

are convinced that Producto die sets maintain accuracy through long runs, keep production up, downtime down.

CONTRACT SHOP OWNERS

have found consistent die set accuracy, dependable delivery, and smooth performance justifies the confidence with which they specify Producto.

Quick, jam-

free assembly and disassembly, lasting accuracy,

unlimited selection of sizes and styles! Add to these advantages the benefits of immediate service in every industrial center through Producto's growing network of 46 branch assembly plants and distributor warehouses...and you realize why "They all prefer Producto". • **A WEALTH OF DIE SET INFORMATION** is available

to you, free, in the comprehensive, easy-to-use Producto Catalog No. 11, and in regular issues of Die Set Digest. Write today for these valuable aids.



THE PRODUCTO MACHINE COMPANY
933 Housatonic Avenue, Bridgeport 1, Connecticut

PRODUCTO
PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

Use postpaid card. Circle No. 239





These CINCINNATI® Shears give

**"A most
outstanding
performance"**

"Any job put on our Cincinnati Shears is routine," says C. E. Ball, Assistant Sales Manager of The Hill-Chase Steel Co., big Baltimore warehouse. "They have accomplished a most outstanding performance."

Faced with customers' demands for increased accuracy in sheared sheet, plate, and strip, more and more warehouses are discovering the profits which Cincinnati Shears can bring them.

The fast and sure way to get accuracy in shearing, slitting, and notching is to specify the Cincinnati line. Our representatives will be happy to discuss your application with you.

Photo Courtesy of The Hill-Chase Steel Co.

Shapers / Shears / Press Brakes

**THE CINCINNATI
SHAPER co.**



Cincinnati 11, Ohio, U.S.A.



Yoder Tube Mills speed tailpipe production at AP Parts Corporation

The AP Parts Corporation (Toledo, Ohio), world's largest producer of replacement mufflers and tailpipes, uses 2 YODER Tube Mills to produce more than 300 ft. of 1 3/4", 1 7/8" and 2" tubing per minute.

According to Mr. John Grindle, Plant Engineer, the two-man operated YODER Mills are vital to the production of the entire plant. "YODER Tube Mills earn their keep daily. They are easy to set up, maintain and operate . . . the welds are clean and uniform. We depend on them for constant quality, high production and minimum downtime".

The YODER Tube Mills at AP Parts exemplify the production economies and dependability of all YODER-built equipment, whether it be Pipe and Tube Mills, Cold Roll-Forming Machinery or Slitting Equipment.

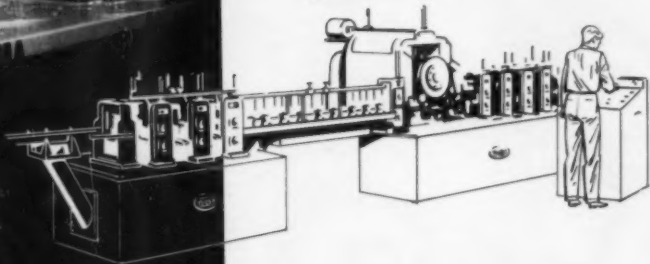
If your products require ferrous or non-ferrous pipe or tubing, from 1/4" to 26" diameters, there is a YODER Mill designed to produce it economically, accurately and efficiently.

THE YODER COMPANY

5509 Watworth Avenue • • Cleveland 1, Ohio



For complete information on YODER Pipe or Tube Mills . . . write for the fully illustrated, 88 page YODER Tube Mill Book . . . it is yours for the asking.



PIPE AND TUBE MILLS (ferrous or non-ferrous)

COLD ROLL FORMING MACHINES

ROTARY SLITTING LINES

ANNOUNCING **NEW** HIGH PRODUCTION END FINISHER

- for
- TUBE
 - ROD
 - PIPE



New Model 660 Speeds Chamfering • Deburring • Facing • Drilling • Reaming • Tube-End Spinning

- Rugged new design for high production, easy operation, faster feeds on simultaneous inside-outside deburring, chamfering, facing.
- New rigid, unitized spindle frame and heavier base retains close concentricity between the tool holder and chuck jaws.
- Simplified setup, operation, maintenance . . . one-minute speed changes with new hinged safety guard and pivoted motor mount.
- Production to 800 ends an hour . . . capacity to 2" O.D. . . . air operation, larger units or special machines are also available.

Write for catalog giving cost cutting features, production data, complete specifications.



PINES

ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

698 WALNUT • AURORA, ILLINOIS



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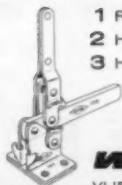


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80 models and sizes...

*made better three ways to
give more positive holding,
last longer!*



- 1 Reamed holes
- 2 Hardened serrated bushings
- 3 High tensile strength rivets

send for free catalogs describing Wespo clamps and fixture details

WESPO DIVISION
VLIER ENGINEERING CORPORATION
Formerly West Point Manufacturing Company
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MACHINE and TOOL BLUE BOOK

CLIP AND FILE

DRILLING TIPS YOU CAN USE

WEB THINNING IS IMPORTANT



Failure to thin the web is a common error in drill repointing. Most drills are made with webs that increase in thickness towards the shank. Always thin the web to its original thickness, using a machine whenever possible.

NEED A CHIP BREAKER?



There is a solution to the nuisance of long chips—a common problem in deep hole drilling. It is Chicago-Latrobe's "LO-TORK" Chip Breaker Drill. "LO-TORK" Drills have radically new flute contours that reduce chips to manageable size.

GOT A DRILLING PROBLEM?

Arrange a consultation with a Chicago-Latrobe Service Engineer. He can help you.

Best tip of all...

ASK YOUR
DISTRIBUTOR
FOR ...



CHICAGO- LATROBE

DRILLS • REAMERS • END MILLS
COUNTERSINKS • COUNTERBORES
CARBIDE TOOLS • SPECIAL TOOLS and
exclusive "LO-TORK" CHIP BREAKER DRILLS



Write Chicago-Latrobe or call your distributor for
CATALOG No. 59. Sixty-eight pages of illustrated
listings and information—including prices.

CHICAGO-LATROBE

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Chicago 10, Illinois

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Allen Hughes

cut abrasive costs 18 to 1 at

Grinding the gripper-die marks off a jet turbine blade can be an expensive business. At the Harrisburg Works of Thompson Ramo Wooldridge, these super-alloy steel blades used to be semi-finished with coated abrasive belts until Industrial and Abrasive Control Engineer Paul Mazich started checking up on costs.

Mazich called in Bay State Abrasive Engineer Allen B. Hughes and he dug into the problem. Working with Bay State distributor General Machinery & Equipment Company, Hughes made a series of careful tests. The result was a grinding wheel that cut the annual cost of abrasive materials

alone from \$18,000 to \$1,000. Its unique combination of special bond and abrasive grit increased cutting speed, prevented loading and eliminated the need for dressing so successfully that productivity rose, labor costs dropped and there were additional savings of around \$5,000.

Like Allen Hughes, the Bay State Abrasive Engineer in your area is a trained expert. He backs up the work of the experienced men who represent Bay State's topflight distributors and Bay State's research labs back them both with new ideas, techniques and materials. *Better grinding at lower cost . . . that is our business.*



Industrial Engineer Paul Mazich examines finish on jet engine blade forging after off-hand grinding operation illustrated at right.



Operator E. S. Jones semi-finishes jet turbine blade in off-hand grinding operation with cool-cutting, self-dressing Bay State grinding wheel.

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Thompson Ramo Wooldridge



Allen B. Hughes worked up through Bay State's Westboro plant and then added extensive field experience so that his knowledge of abrasive problems and practical solutions for them covers every phase of abrasive engineering.

BAY STATE ABRASIVES



Bay State Abrasive Products Co., Westboro, Massachusetts.

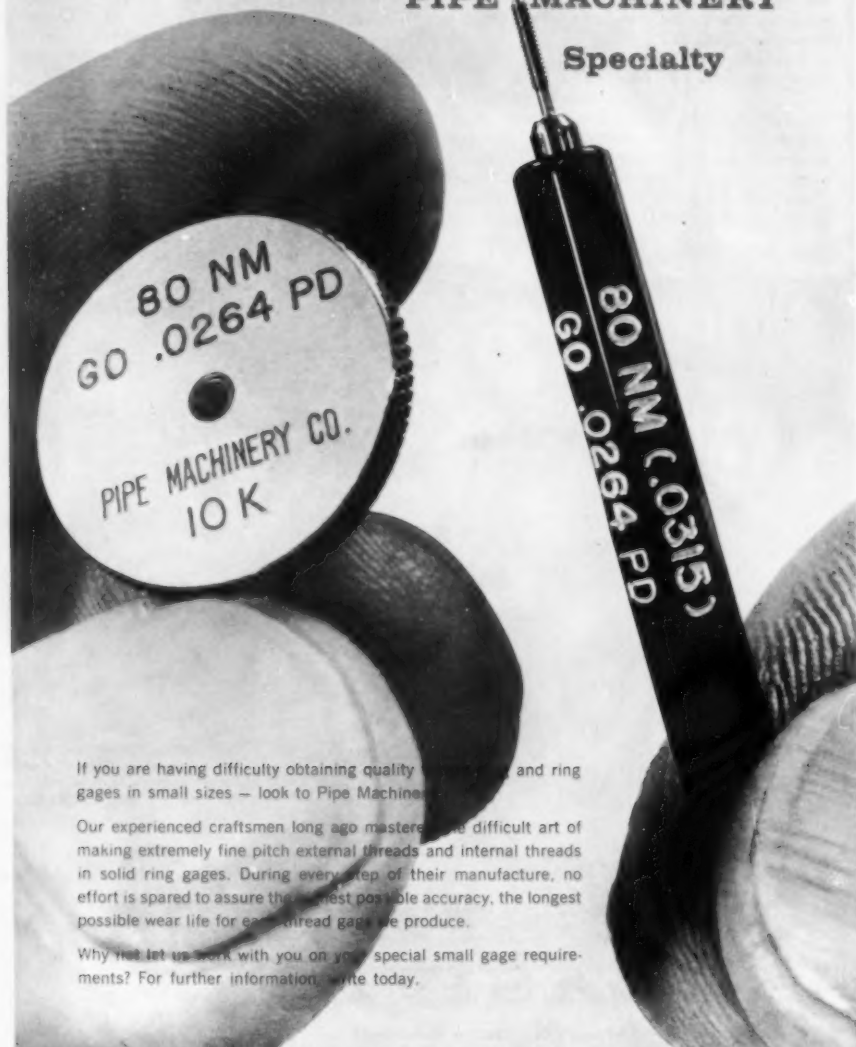
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.

Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh, Los Angeles. Distributors: All principal cities.



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**Small Thread Gages are a
PIPE MACHINERY
Specialty**



If you are having difficulty obtaining quality tapered plug and ring gages in small sizes — look to Pipe Machinery.

Our experienced craftsmen long ago mastered the difficult art of making extremely fine pitch external threads and internal threads in solid ring gages. During every step of their manufacture, no effort is spared to assure the highest possible accuracy, the longest possible wear life for each thread gage we produce.

Why not let us work with you on your special small gage requirements? For further information, write today.

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LOOK TO AMERICAN TOOLMAKERS FOR THE FINEST CUTTING TOOLS



Today's high speed steel tools for milling, sawing, tapping, drilling, broaching, reaming and other metal cutting operations are better than ever. Through research and development, and new and better production methods, American toolmakers are constantly improving high speed steel tools to help you make better products . . . at less cost.

As a leading producer of high speed and other specialty steels, Universal-Cyclops continues to aid your toolmaker's efforts with its own aggressive research and development program.

*Look to your American toolmaker
for the finest in
high speed steel cutting tools!*

CUTTING TOOLS made from HIGH SPEED STEELS

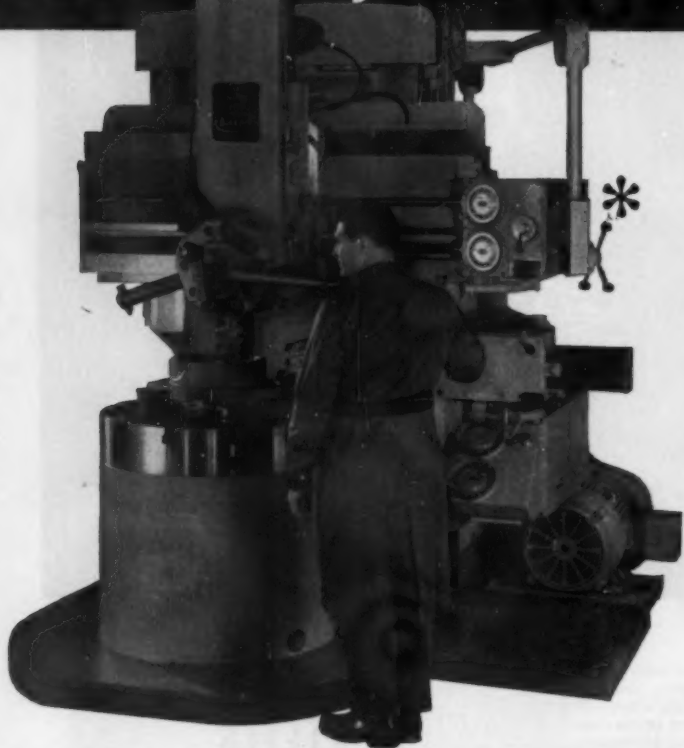
*are
Better Than Ever*

**UNIVERSAL
CYCLOPS**
STEEL CORPORATION
BRIDGEVILLE, PA.

TOOL STEELS • STAINLESS STEELS • HIGH TEMPERATURE METALS

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NOW Bullard DYNATROL* FIRST fully Power-Controlled V.T.L.



Dynatrol® V.T.L. has Bullard's new Dynamic Precision Control . . . a fully powered machine tool control system which pays off in greater production.

Dynamic Precision Control keeps the tool in the cut more of the time . . . cuts time between cuts . . . increases the operating speed and output of the machine.

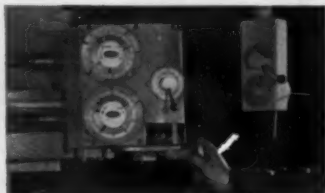
Dynatrol provides infinitely variable feed rates throughout the full range and variable traverse rates from zero to nine feet per minute. Feed rates may be advanced or retarded while the machine is cutting to obtain maximum tool performance and productivity. Nine sizes from 26" to 124" table diameter.

Send to The Bullard Company, Bridgeport 9, Connecticut, for detailed catalog. Telephone EDison 6-2511.

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* The control center of the New Bullard Dynatrol V.T.L. provides single lever control for all motions of each head. Feed rates — infinitely variable from zero to maximum — are directly geared to table rpm. A simple pendant controls start, stop and speed of table. Equally simple remote controls are available for machines of all sizes.



High-Spot Features of the DYNATROL® V.T.L.

Dynatrol V.T.L. is POWER CONTROLLED

By lever or pendant — it's your choice — head traverse rates can be varied from zero to nine feet per minute. Easy-to-read dials show exact position.

Feed selector gives infinitely variable feed rate without interrupting the cut.

Dynatrol V.T.L. is VERSATILE

Available equipment includes:

Bullard variable speed drive for infinitely variable table speeds throughout the full range with no loss of usable horse power.

Fully automatic operation by Bullard Man-Au-Trol or point-to-point or continuous path numerical control systems.

Unique Size-Au-Trol for accurate positioning of all heads. Contouring attachments: Hydraulic, electronic or electro-hydraulic. Four or five-ported power indexing turret heads. Thread cutting, drum scoring and angle turning attachment. Power-operated chucks.

Dynatrol V.T.L. is COMPACT

The new Bullard Dynatrol V.T.L. is compact in design, rigid in construction, lower in height, reduced in floor area.

Dynatrol V.T.L. is EASY TO MAINTAIN. Automatic lubrication throughout . . . fewer parts . . . fewer adjustments . . . easily accessible.

BULLARD

"YOU CAN'T BEAT A BULLARD"



A skilled craftsman uses a Foredom machine with a fine dental burr to finish off the carving of the earth's contours on the 6' 3" diameter, 3-dimensional epoxy globe designed and built by Geo-Physical Maps, Inc., NYC. The first of its kind, this globe sets a new standard for scholarly research and manufacturing techniques, and the finest tools available were chosen to execute the intricate detail involved.

all over the world...

FOREDOM FLEXIBLE SHAFT MACHINES

*do the most intricate
jobs... better!*



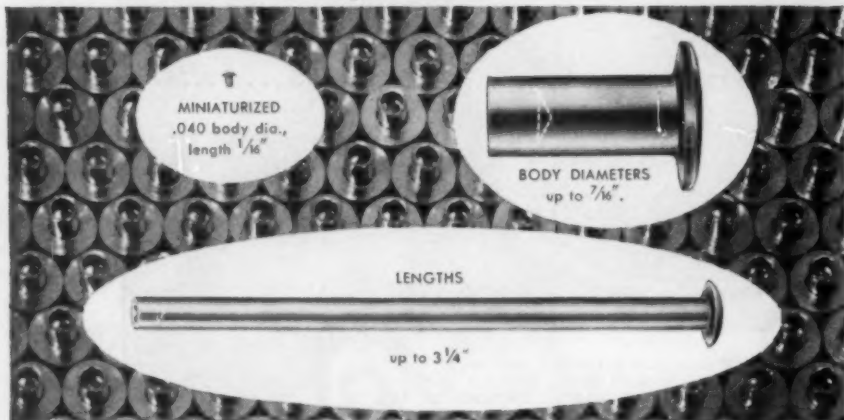
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| Grinding & finishing | • Buffing & polishing |
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More and more craftsmen handle small precision jobs faster, better and easier with Foredom Flexible Shaft Machines — whether they work in metal, plastic, leather, rubber, wood or glass. They like Foredom's variety of slim handpieces which give perfect control at all speeds. Inexpensive, easily portable, these machines are ideal for both maintenance and production. For more information, write today for catalog **310-M1**.

FOREDOM ELECTRIC COMPANY, INC.
BETHEL, CONNECTICUT



Look at this Size Range of Semi-Tubular Rivets... *it's the way to lower cost*



Miniaturized components and also large complete assemblies can now have all the money-saving advantages of using single and multiple automatic riveting. This is due to the wider size range of semi-tubular rivets now available and which can be used in conjunction with motor and pneumatic driven automatic riveting machines.

Today, there is hardly a fastening problem, involving even fragile materials, that does not warrant consideration of low-cost semi-tubular rivet setting.

Our Factory Riveting Specialists are ready to help you obtain the **REAL COST FACTS** on your own specific fastening problem. There is no obligation.



FOR YOUR FILES

Chicago Rivet Catalog describes 1388 standard tubular and split rivets and 25 single and multiple automatic rivet setters.



AIR-POWERED RIVETING

contains description and specifications of 8 single, multiple riveters—also rivet setters designed for automated operation.

Chicago Rivet & MACHINE CO.

947 So. 25th Ave., Bellwood, Ill. (Chicago Suburb)

Branch Factory: Tyrone, Pa.

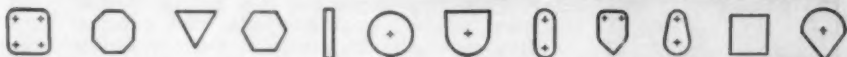
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**Another
advancement
in perforator
grinding...**

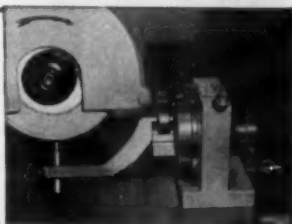
Easily grinds irregular shaped perforators concentric with shank within $\pm .0002$ accuracy. Also, can be used for light milling and boring fixture, inspection tool, etc.

HARIG *Grind-All* **FIXTURE**

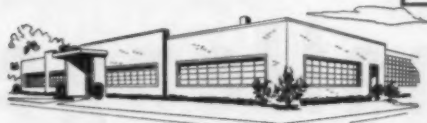


- 1** Single locking screw—fast action v-block adjustment holds it in desired position.
- 2** Handy crank speeds rotation of index plate.
- 3** Hardened and ground construction—a life-time of service and precision accuracy.

**NEW
RADIUS
DRESSER
ARM**
**ACCURATE
EASY-TO-USE
ECONOMICAL**



ATTACHMENT QUICKLY CONVERTS HARIG GRIND-ALL FIXTURE INTO A PRECISION RADIUS DRESSER



"Made by the house that Precision Built"

Don't wait! Send now for more information about Harig's new Grind-All Fixture.





need to hold **CLOSER TOLERANCES?**

HERE ARE OVER
300 AIDS to
**PRECISION
PRODUCTION**

More than 300 different items are available in the Challenge Precision Surface Equipment line to help you maintain close control of accuracy in your tooling, manufacturing assembly and inspection operations.

These include both Granite and Meehanite Surface Plates of all types and sizes. Also Meehanite Angle Plates, V-Block, and many other items of precision surface equipment. In addition, many special sizes and types can be made-to-order.

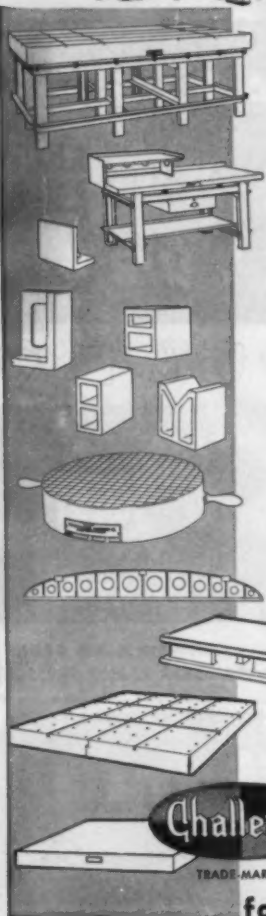
Take this important step toward cutting costs and minimizing rejects. Get information on Challenge Precision Surface Equipment to improve your operations.

SEND FOR THIS HANDY FREE CATALOG covering description and prices on all standard items.

THE CHALLENGE MACHINERY CO.
GRAND HAVEN, MICHIGAN



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Challenge

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challenge

PRECISION SURFACES

for LAYOUT • INSPECTION • ASSEMBLY

Want Results like this?

This sales engineer reports another dramatic success in the heavy duty application of CIMPRIAL new chemical cutting fluid of the famous Cimcool line. Production up — on low clearance, low speed, heavy cut jobs previously limited to cutting oils. (Company name on request)

SALES REPORT

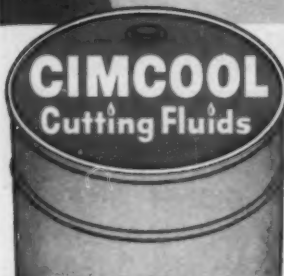
2

truck manufacturer. They were using a straight cutting oil on a crankshaft lathe operation and were getting so much smoke the union complained.

The company was planning to install an expensive special exhaust system when they tried Cimperial. Operators like its performance and complete absence of smoke. Union dropped complaint.

Cimperial now in 10 lathes at 1:20 dilution at cost of only 10¢ per gallon of mix. They previously used straight cutting oil at 49¢ per gallon.

Ed Kennedy
New York office



FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL 52 Concentrate—The pink fluid which covers 85% of all metal cutting jobs.
CIMPRIAL—newest in the famous, industry-proven line of Cimcool® Cutting Fluids.
CIMPLUS—The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (A.A., MC, SS)—For every job requiring an oil-base cutting fluid.
ALSO—CIMCOOL Tapping Compound—CIMCOOL Bactericide—CIMCOOL Machine Cleaner.

For full information on the complete family of Cimcool Cutting Fluids, call your Cimcool Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

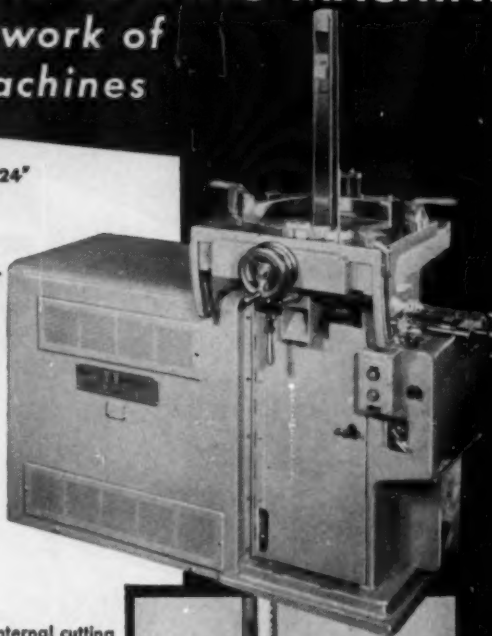
*Trade Mark Reg. U. S. Pat. Off.

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AMAZING NEW **M&M** KEYSEATER AND VERTICAL CUTTING MACHINE

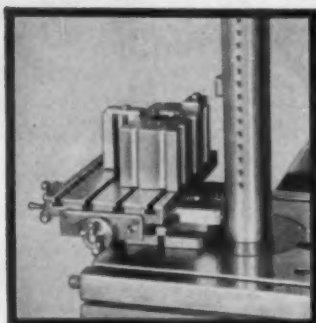
*does the work of
many machines*

In addition to a keyseater that cuts internal keyways up to 3" wide x 24" long, the new hydraulic M & M is a handy tool room machine and can be easily adapted to special production jobs other than keyways. A wide variety of internal or external cuts, serrations, grooves and teeth can be rapidly made on this machine. With a combination tilting table and index table (shown on machine at right) straight or tapered bores and accurately spaced multiple keyways or splines may be cut at any degree of the circle. Send us prints of your cutting problems.

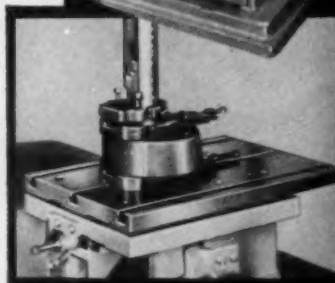


Right: Set-up for internal cutting

Below: Set-up for external cutting



106



BUILDERS OF MACHINERY
SINCE 1854.

M&M KEYSEATERS AND
VERTICAL CUTTING MACHINES

MITTS & MERRILL • 1015 So. Water St. • SAGINAW, MICHIGAN
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AK**PRECOR**

MACHINE TOOL ATTACHMENTS



**Model 400
AK BED TURRET
for Engine Lathes**

Converts to ram-type turret lathe production. Self-indexing six stations and mounted on 8" dia. for added tool clearances.

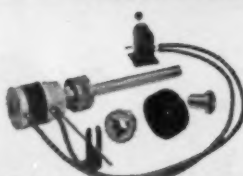


Pre-Cor HAND-LEVER COLLET CLOSER
Ball-bearing mounted. Collet capacity:
1-1/16" Fits variety of lathes.



AK BAR FEED

Automatic air-operated bar stock feed. Capacities to 3 1/2" dia., 25' length. Complete with adjustable stands.



Pre-Cor AIR-OPERATED COLLET CLOSER
For 10" to 18" lathes. Cuts bar fatigue, increases production.

Std. or
swivel bases



Pre-Cor DIVIDING HEADS

For universal use of mills and tool grinders. Three sizes: 6 1/2" swing (11" with riser blocks), 8" (12" w/risers), and 10" swing.

For complete information and prices, write:

AK**PRECOR****PRECISION PROCESSING COMPANY**

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TOOLROOM GRINDERS

**MANY UNUSUAL FEATURES
ASSURE HIGH EFFICIENCY**

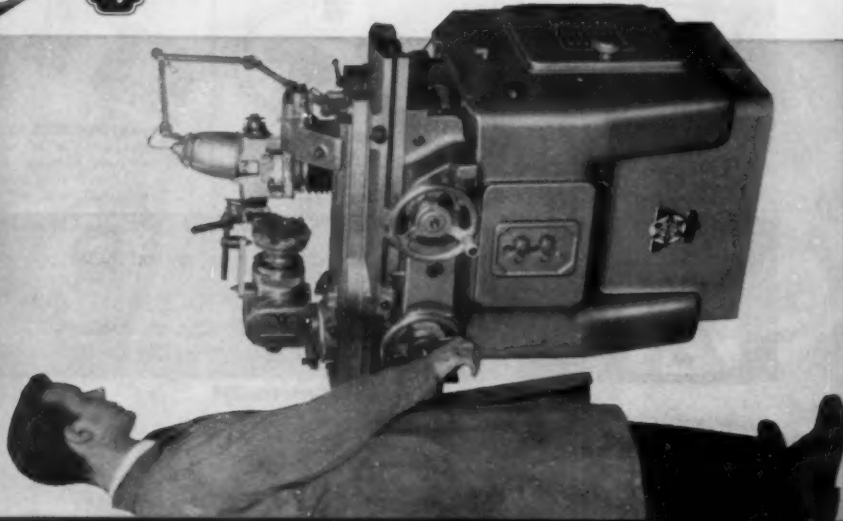
MODEL 310 CUTTER AND TOOL GRINDER

This grinder efficiently performs a wide range of grinding operations. Thus, tools and cutters can be ground in shortest possible time to keep production costs at a minimum.

FEATURES:

- Universal operating positions—all within comfortable reach of operator
- Anti-friction cross saddle mounting assures sensitive control to cross feed
- Table traverses on precision roller chains, giving "fingertip" control
- Table dogs reversible—one end spring loaded and the other a dead stop
- Table swivels a full 90 degrees in left-hand direction and 45 degrees right-hand
- Large diameter wheel spindle, mounted on specially selected preloaded bearings
- Universal Cutter Head adjustable to swing from 8" to 12" diameters
- Cutter Head and Tailstock provided with clearance angle setting adjustments.

For additional information, write for Micromatic Bulletin 139W.



MODEL 1014 UNIVERSAL TOOLROOM GRINDER

This 1014 Universal Tool Room Grinder is designed to give extraordinary sensitive control that results in high quality external and internal grinding.

Wheelhead has deep throat capacity and wheel position is centralized in relation to table. This permits surface grinding and offers special facilities for broach grinding.

The extra Universal Cutterhead extends the versatility of this highly accurate machine to cover tool and cutter grinding.

FEATURES:

Hand cross feed and vertical feed in .0001" increments • Auto cross feed per reversal of table of .0001" to .007" over .025" (reduction in work diameter of .050") • Automatic table traverse, 4 speeds provided. Micrometer adjustment to table traverse in .001" divisions • Wheelhead saddle on anti-friction mountings • Precision built wheelhead motor on anti-vibration mountings • Wheel spindle unit swivels full 360° • Five external grinding wheel speeds • Grinding wheels fitted on either end of wheel spindle. Nitralloy spindle runs in plain bearings • Vernier scales to wheelhead and table swivels • Fast cross traverse to wheelhead for setting purposes.

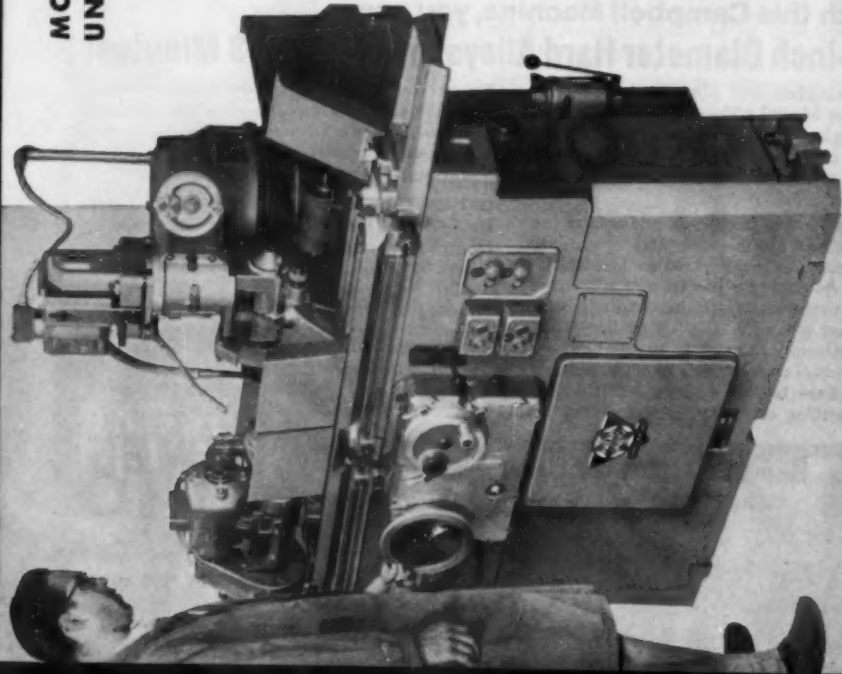
For additional information, send for Micromatic Bulletin 206Q.

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MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN



Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

ACCO
For Better
Value



With this Campbell Machine, you can -- **Cut 6-inch Diameter Hard Alloys in Less than 3 Minutes!**

• **This Campbell wet abrasive cutting machine—the Model 406—will cut tubing, bar stock, angle iron, or any other shape up to 6" round or square—and it will cut practically any material, including the new super alloys and exotic metals.**

High speed • 4 to 8 seconds per square inch is normal wet abrasive cutting speed. Cut 6" diameter hardened steel in less than 3 minutes. **Accuracy** • Model 406 will cut 3" diameter material to lengths within $\pm .010"$, 6" diameter within $\pm .030"$. **Fine finish** • No burn, minimum burr. **Power oscillation** • Cutting wheel moves back and forth across cut as wheel is fed downward. Result—greater cutting capacity, longer wheel life.

Proper coolant application • Large reservoir, 33 gallon/min. pump, give high coolant volume. Unique Campbell distributor applies coolant equally to both sides of wheel—a requirement for accurate cuts.

OTHER CAMPBELL MACHINES FOR ANY CUT-OFF NEED • Choose from four types of Campbell machines for wet or dry cutting—chop stroke, oscillating, horizontal or rotary—with capacities up to 14" rounds, 12" billets, plate up to 6" thick and 20 ft. long.

Write for Bulletin DH-260 for details on the Model 406, or describe your cut-off application and we'll send you information on the proper Campbell machine.



CAMPBELL ABRASIVE CUTTING MACHINES

Allison-Campbell Division • American Chain & Cable Company, Inc.

937 Connecticut Avenue, Bridgeport 2, Conn.

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EMPIRE

**CUT-OFF
BLADES**

(SEVERAL TYPES)

FASTER, accurate cut-off
LONGER cut-off blade life
SMOOTHER cut-off surfaces

WIDEST RANGE OF BLADE MATERIALS

1. Empire cut-off blades are available in four grades of H.S. Steel (high-cobalt, high-vanadium). Range covers most any requirement for H.S. Steel tooling.
2. Solid cast-alloy blades (non-ferrous, cobalt-chromium-tungsten) have high red-hardness, superior resistance to abrasion and are non-magnetic.
3. Carbide tipped cut-off blades come in four grades of carbide—the best carbide for each job can be furnished.

SUPERIOR DESIGN FEATURES

1. **Faster Cutting**—precision grinding of all blade surfaces assures sharper cutting edges.
2. **Reduced Friction**—hollow-ground top causes chips to collapse, relieving friction against sidewall of cut.
3. **Cooler Cutting**—collapsed chips permit coolant to reach blade cutting edges.
4. **Greater Precision**—blades are precision ground on all surfaces, centrality of head to shank is held to close tolerances.
5. **Smoother Cut-Off Surfaces**—sharper cutting edges, collapsed chips, better coolant flow, and liberal side clearances add up to smoother cutting.
6. **Longer Blade Life**—wide selection of blade materials, finest blade design, resharpening on front face only, assures longer life on every cut-off job.

*Made under license issued by John Milton Luers
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TOOL COMPANY

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NERCO 2010 END MILLS

CUT UP TO 70C SCALE ROCKWELL HARDNESS

Prove it to yourself. Take a 302 Stainless Steel casting. Feed it at 1100 rpm, $3\frac{3}{4}$ " per minute. See how the new alloy Titanium Nerco 2010 end mills cut—up to 25% faster, with a smoother finish than you have ever experienced.

Nerco 2010 end mills take the tough metals (up to C-70) and the usual jobs in stride—no chipping, no burring, eliminates much hand finish work. Saves down time and regrinding costs. Available in $\frac{1}{8}$ " to $\frac{3}{4}$ " diameters...or made for your specifications. Write for full information and the name of your nearest distributor.



R-235 • L-605 • VASCO SUPREME • HIGH NICKEL STEEL • 200-400 STAINLESS



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INDUSTRIAL DIVISION, 1608 Centinela Ave., Inglewood 3, Calif.

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the sign of a good shop

new **g** master model GH
& long bed lathes

Precision plus . . . Power to spare. The enormous power and accuracy built into the new Carroll-Jamieson Master Model Geared Head Long Bed Engine Lathe allows it to do precision work—at today's high production speeds. Makes it the ideal lathe for use in textile mills, paper mills, machine shops and in many other operations where high speed accuracy is needed.

Embodies features found only in higher priced lathes. 12 geared spindle speeds provide tremendous pulling power of from 20-900 rpms. Timken heavy duty taper roller bearings on the spindle. Quick change gear box. Rugged 5 hp motor. Wide range of threads and speeds—48 separate threads 3-184. Available in 16" or 18" swing. Center distances to 132" (In special cases, to 158").



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giving complete
technical data.

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Dept. 1 Batavia, Ohio

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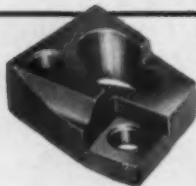
Wesson Presents a New Era of with the all-new **WESSON T-A***

Now after two years' research and 25 tested prototypes, Wesson brings to industry the all-new Wesson T-A*. Completely new in design, performance and value, the Wesson T-A* simplifies your tooling for throw-aways, saves time, effort and money. It has just two units plus the tip, yet

gives full adjustability, within its range, for any insert or chip-breaker setting. Tool changes and adjustments are made quickly, easily, regardless of holder position or orientation. Write today for detailed information on the all-new Wesson T-A*.

The new WESSON T-A* handles more parts with less tooling. Here's why...

2 in 1 Anvil-Locator with Flat Anvil Seat



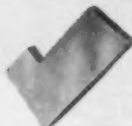
Precision, one-piece investment steel casting for maximum strength and rigidity. Coined seat assures flatness. Zero side overhang permits compact ganging of tools. Designed for $\frac{3}{16}$ " thick inserts but can also use $\frac{1}{8}$ " with locked-in shim. Fine detail in holders makes possible use of inserts with radii as small as $\frac{1}{4}$ ". Protects shank, easily replaceable when damaged. New shank purchase unnecessary.

Wide Range, Vise-Jaw Type Clamp Unit



Fast, parallel clamping at all times. No breakage of inserts or chipbreakers when indexing or changing inserts. Complete clamp assembly rides up and down on compound screw. Large clamping range. Set low, set back and relieved so chip will not hit clamp. Can be used without chipbreaker on cast iron, etc. Design prevents incorrect reinsertion if assembly is removed from shank.

Adjustable, Solid Carbide Chipbreaker



Adjustable over wide range, with vertical and visible serrations. Regrindable six times. Supported and spring-locked in channel of clamp yet easily adjusted or removed with fingers. Rides up and down with clamp when indexing, cannot drop out.

WESSON COMPANY

**1220 WOODWARD HEIGHTS BLVD.
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In Canada: **WESSON CUTTING TOOLS, LTD.** 93 Judge Road, Toronto 18, Ontario

Progress

TOOLHOLDER

- *easy to USE*
- *easy to INDEX*
- *easy to STOCK*

The new Wesson T-A* has fewer and simpler parts. Indexing is fast, sure. Chipbreaker adjustment is easy, positive. One Allen wrench serves any tool. Design permits absolute repeatability of settings.

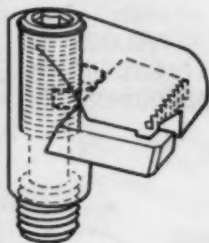
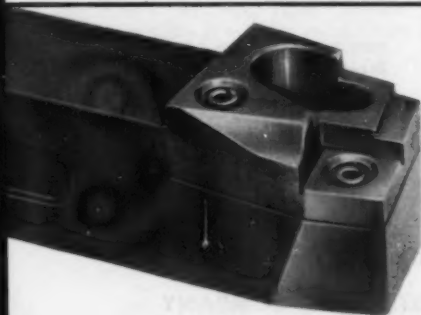


*THROW-AWAY

JUST TWO SIMPLE UNITS

NO. 1 SHANK UNIT—A semi-permanent "assembly" consisting of 4 replaceable parts—shank, anvil-locator with coined seat and two roll pins attaching the anvil to the shank. No adjusting required.

NO. 2 CLAMP UNIT—Its four parts—clamp, compound screw, spring clip and chipbreaker—can't come apart in use or when indexing tips. Stainless steel spring clip retains chipbreaker in any position.



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★ **OPERATES ANYWHERE**

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MACHINE and TOOL BLUE BOOK

LOWEST COST

*per drilled
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Two vital factors in drilling costs are Machine Investment and Operator Time ... and CINCINNATI Customized Sliding Head Drills minimize both!

Your CINCINNATI is "tailored" to suit your type of work exactly. You buy only the cost-saving combination you need—minimum machine investment. You provide all the necessary time-saving equipment—the operator keeps the drill cutting more of the time.

And, these CINCINNATI Drills are *economy-priced!* The basic 24" machine with 6-speed vee-belt drive and hand feed—ideal for general purpose work—is only \$1090 ... only \$975 for the 16" model.

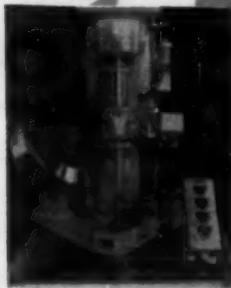
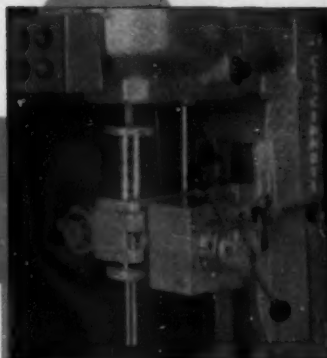
For toolroom work with many different hole diameters, the model shown at right above, has Infispeed variable speed drive and extra large work table.

If you do a lot of production drilling and tapping, you would want power feed with precision depth stop and feed disengage, and electrical tapping with automatic tap reversal, shown at right center.

Or, your CINCINNATI can provide a wide variety of economical automation, as in the fully automatic nut-tapping setup at lower right (only \$4,000).

These machines are built in medium duty 16" and 24" sizes with 1" capacity, heavy duty 21" and 25" sizes with 1½" capacity.

Ask your Cincinnati Lathe and Tool Dealer to recommend the exact machine for your jobs—or write to us direct.



CINCINNATI LATHE AND TOOL CO.

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"HYDRASHIFT" Lathes/"CINCINNATI" Drilling Machines/"SPIROPOINT" Drill Sharpeners

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The Only Complete, Comprehensive STOCK LINE of MULTI-USE, SOFT RUBBER BONDED ABRASIVES

**Broad, New, Time-Saving
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Never Before Associated with
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Not until you've investigated Brightboy's unique rubber and abrasive working action can you conceive of its exceptional time-saving, work-quality benefits. A Brightboy finish often constitutes the final polish!

Brightboy replaces older, costlier methods:
BURRING • FINISHING • CLEANING • POLISHING
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- FREE SAMPLE HAND PIECE
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Brightboy's extensive applications, almost unbelievable versatility, begin at the point where other abrasives and cutting tools finish their functions.

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in a wide range of grades and textures, are **JOB-MATCHED** to your machine and manual operations.

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MACHINE and TOOL BLUE BOOK

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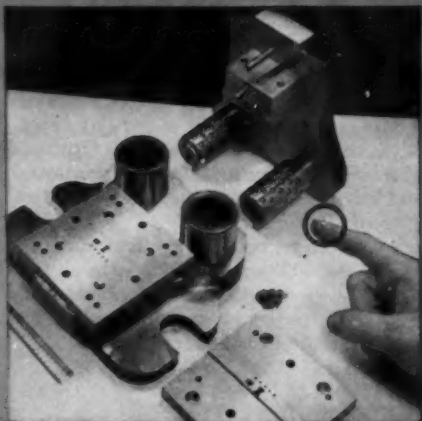
"It Couldn't Be Done"

BUT ONLY LEMPCO 2 POST STOCK* DIE SETS COULD DO IT!

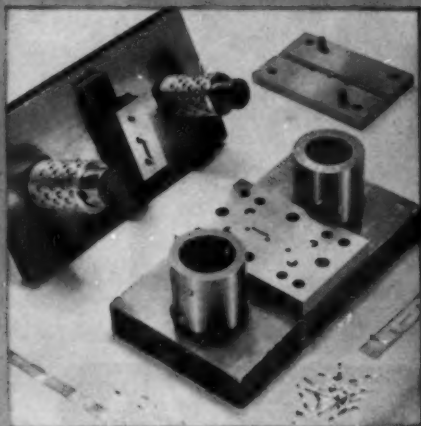
To the best of our knowledge, LempcO is the only 2-post STOCK* die set which could produce this electronics part from .001" thick high nickel alloy material—with punched holes of .001" diameter. This die, mounted in a standard LempcO STOCK* die set, produced 30,000 burr-free parts on its initial run.

Users everywhere have found that a STOCK* LempcO 2-post die set will out-produce special 4-post "friction type" sets—at a fraction of the cost. You can prove this to yourself!

*Off-the-shelf DELIVERY, with warehouse stocks in all major metalworking areas of the U.S.A.

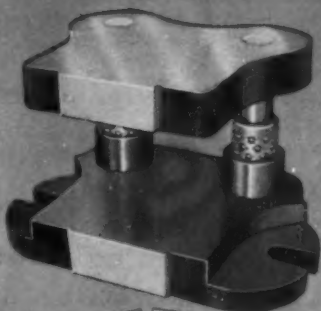


MATERIAL: .001" Thick, High Nickel Alloy
Punched Holes, .001" Diameter



WRITE OR PHONE US TODAY
FOR FURTHER INFORMATION.

Diebuilder: Vameco Machine & Tool, Pittsburgh



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LAPMASTER OPTICAL FLATS

So accurate . . . so easy to get flatness readings down to 1/10 of a light band with the Lapmaster line of Optical Flats. Special manufacturing technique and laboratory control assures uniform flats of highest quality.

Available in certified optical accuracies of .000002" or .000001" . . . in either clear fused quartz or Pyrex glass . . . either double or single surfaced . . . in a full range of standard sizes from 1" through 12" dia.



THE LAPMASTER MONOCHROMATIC LIGHT

There's no easier way to inspect and measure surface flatness. The new Lapmaster Monochromatic Light has a powerful helium lamp (40 candle power) for sharp reading . . . light head is adjustable for best reading angle; can be swung completely around to handle tall parts . . . is easily portable in self-contained carrying case.



Write for complete details and measurement chart.



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MACHINE and TOOL BLUE BOOK

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Hammond **UNIVERSAL BELT GRINDER**



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ROD GRINDING HOLDER



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CONTOUR WHEEL GRINDING



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This modern Hammond Universal Belt Grinder provides more ways of using abrasive belts on one machine than ever before. It can be used for a wide variety of grinding, polishing, buffing and deburring operations. This time-saving machine will speed up production and decrease labor costs on many operations in your tool room, machine shop, fabricating, assembly and other departments. Can be furnished as a bench or floor model, with or without built-in DusKolector. Many combinations available. Write for catalog.



Model UBG-50 —
Other combinations available.

**GRIND...POLISH...BUFF...DEBURR
ON ONE MACHINE!**

Hammond Machinery Builders
INC.

1614 DOUGLAS AVE. • KALAMAZOO, MICHIGAN

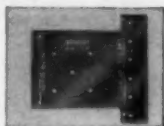
AMERICA'S MOST COMPLETE LINE OF GRINDING, POLISHING AND BUFFING EQUIPMENT

layout
and template
making time
cut in half

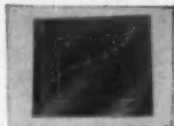


NEW STRIPPIT FLEX-O-DRILL

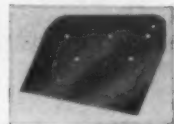
- **DRILLS, REAMS, SCRIBES, CENTER PUNCHES** to $\pm 0.002"$ **WITHOUT** base line drawing or height gauge layout!
- **EASY, ACCURATE POSITIONING**—quickly set to any reference point and to nearest 0.100" by adjustable steel tapes reading in both directions from zero. Micrometric gauges then bring settings to nearest 0.001". No optical scanning device needed.
- **LASTING ACCURACY!** Table is an actual ground surface plate. Bridge assembly is of heavy, accurately machined castings. Lead screws are precision ground and engaged only during micrometric gauge settings to minimize wear. All parts are corrosion-resistant. Bearings are protected against dust and chips by felt shields. Drill motor is heavy-duty industrial type.
- **1/4" CAPACITY** in mild steel—stock up to 24" width, any length.
- **ALSO A PROVEN MONEY-SAVER** on pilot runs, low unit production.



Template drilled by
Flex-O-Drill



Layout scribed by
Flex-O-Drill



Flex-O-Drill
work piece

WALES STRIPPIT INC.
204 Buell Road, Akron, New York



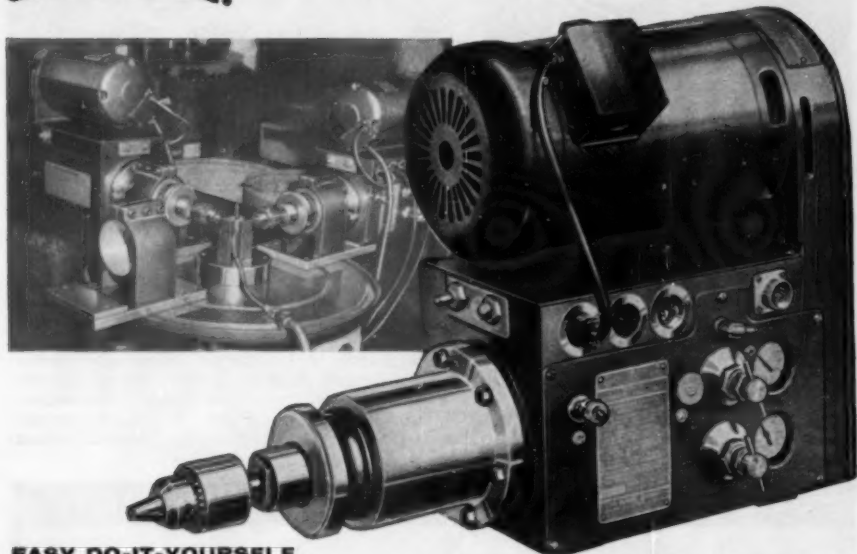
In Canada: Strippit Tool & Machine Company, Brampton, Ont.

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demonstration at
your plant.

versatile "building blocks" for...
 simple, cost-cutting set-ups

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EASY DO-IT-YOURSELF ARRANGEMENTS...

completely built-in power and controls and simple nose mounting bracket let you mount Dumore Drilling or Tapping Units to get single or multi-hole machining set-ups. Completely automatic!

do all these jobs — and more...
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All Purpose
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 Metalworking
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...for a demonstration. 3 models to choose from, priced from \$565.75, FOB Racine, complete with all components including motor, ready to operate.

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NEW!

GREATEST CUT-OFF CAPACITY IN ITS CLASS!



• This newest addition to the Sever-All line of abrasive cutting machines—the Model 2-A—provides greater cutting capacity and more flexibility than any other machine in its class. Check these important advantages:

Big capacity • cuts 4" round or square solids, 5½" o.d. pipe or tubing, 6"x1" flat stock, 6" angle iron and 8" channels. Cuts practically all metals. **Fast operation** • ac-

curate cuts at rates of 2 to 3 seconds per square inch. **Power oscillation** • oscillation is the forward and backward motion of the cutting wheel as it is fed down into the cut. It provides extra cutting capacity, longer wheel life, cooler cutting and reduced operator fatigue. **Quality cuts** • clean, smooth cuts, require little or no finishing operation. **Economy** • Sever-All wheels, developed especially for the Model 2-A, provide lowest cost per cut.

VARIETY OF WORK HOLDERS GIVES UNUSUAL VERSATILITY



V-block with quick-action clamp



Angle-cutting work holder



2-way clamp for irregular shapes

• Choose the work holders you need from several optional arrangements. These include the vise-type holder shown on the ma-

chine at top, plus the V-block, angle-cutting and 2-way clamp fixtures above. Screw-type and quick-action clamping interchangeable.

Write for details on the new Model 2-A Sever-All abrasive cutting machine. Ask for Bulletin DH-299

SEVER-ALL ABRASIVE CUTTING MACHINES

Allison-Campbell Division, American Chain & Cable Company, Inc.

937 Connecticut Avenue, Bridgeport 2, Conn.

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interchangeable with all
standard JIC cylinders

With the introduction of the **ALL NEW T-J Squair Head**, Tomkins-Johnson now offers industry the most complete design range of air and hydraulic cylinders. Presently available in bore diameters from 1½ to 8 inches, the T-J Squair Head is an interchange-

able cylinder which produces maximum force and efficiency, with minimum pressures ... and is also adaptable to the use of low pressure oil as the working medium. Write today to Tomkins-Johnson, Jackson, Michigan, for Bulletin #SQ 10-58 and complete details.

CHECK THESE 10 POINTS OF T-J SUPERIORITY

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| 1. One Piece Piston | 6. Solid Steel Heads and Mounting Plates Standard all Models | 10. Piston Rod, Extra Strong—Polished and Chromed Plated for Efficiency and Protection |
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| 4. Cushion Adjusting Screw, Externally Adjustable | 9. Piloted Packing Gland—Absolute Alignment | |
| 5. New Super-Cushion for air, or Self-Aligning Master Seal for Oil (T-J Patents) | | |



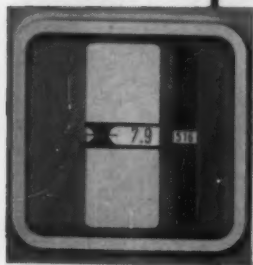
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DECKEL*LK Machine Tool Series Brings You...*

Direct Numerical Readings To .0001"
And Interchangeable Heads
for
Optical Coordinate

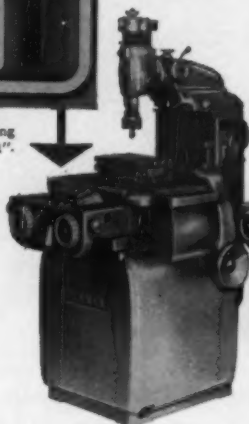


Projection screen showing scale readings to .0001".

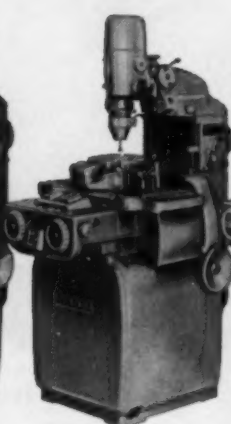
**Jig
Boring**

**Jig
Grinding**

**Profile
Measuring**



DECKEL LKB Jig Borer
Worktable area: 25.6" x 11.8"



DECKEL LKS Jig Grinder
Worktable area: 25.6" x 11.8"



DECKEL LKM Measuring Machine
Magnification: 10X, 20X

This outstanding machine tool development couldn't be more timely. The new DECKEL LK series of optical coordinate machine tools combines economy with extreme precision—at a time when these two factors are highly critical.

Three Machines in One—Simple interchangeability of jig boring, jig grinding and profile measuring heads gives you a choice of one, two or three machines on one universal base. Change from one head to another takes only minutes. Used individually, each one of these machines will give you remarkable accuracy and performance.

Direct Numerical Readings—For the first time on any machine tool, coordinate table settings can be read directly in numbers to ten-thousandths (.0001") of an inch. No conversions or interpolations are needed. Reading errors are practically impossible. Actual positioning accuracy is within .00012".

Thermal Expansion Compensation—The inherent accuracy of these machines is protected by a unique thermal expansion compensating device—built-in to the supporting bracket. Dissipation of heat from the gear box and drive motor provides additional thermal stability.

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This is a new exclusive design, a product of B & S progressive engineering and manufacturing techniques. The Thriftmill can be produced faster, more efficiently and therefore costs less. Demand for the new Thriftmill is so phenomenal—large volume production lowers manufacturing and distribution costs.

Shop tested on profiling, slotting, peripheral milling and many other general end milling operations, the Thriftmill excels in over 80% of production applications. The new Thriftmill may mean new end milling economy and efficiency for you.

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CUTTING TOOL DIVISION

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HELCO CARBIDE TOOLS

END MILLS



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No other low priced bearing metal delivers all the many fine qualities embodied in Bunting Bearing Aluminum. Its physical properties add up to a remarkable and ideal material for most general bearing applications. Light weight is an added advantage. It machines easily and rapidly, saving labor cost. All bars are machined on all surfaces, reducing waste metal to the minimum. And it is carried in stock in 138 sizes of 13" tubular and solid bars by your local Bunting Distributor.



case in point*

Specimens of Bunting Aluminum Bearings replacing bearings of other metals which cost twice as much. No sacrifice of performance or life.



1. Aluminum cuts cost of this big cylinder gland bearing. 2. You can machine aluminum to the most exacting tolerances. 3. Aluminum solid gear bearings cost less, weigh less. 4. Great economies in thick wall bearings.

MACHINE SHOP SERVICE . . . Small lots of special design bearings, not obtainable from stock, can be procured immediately from fully equipped machine shops through all Bunting Branches. The wide range of sizes of Bunting stock cast bronze and sintered bronze bearings makes the alteration of a stock item to a special bearing easy and economical. Bunting Cast and Sintered Bronze and Bunting Bearing Aluminum Bars provide the material for special sizes and designs which cannot be made from stock bearings. Your local Bunting Distributor can arrange for such work.

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The right machine, the right method, the right media—that's the basis for any ALMCO *Supersheen* System. A continuing program of research—that's the secret of ALMCO progress in making metal finishing easier, faster, finer. Here are typical recent developments.

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For precise finishing of complex high-quality components on a continuous production line basis. Large parts or clusters of smaller parts are chucked directly to spindles from single operator's work station. Rotating spindles lower parts into high velocity stream of abrasive media contained in rotating tub. All surfaces get same amount of precision finishing in 1 to 9 min. trip around the tub.



Models available with automatic or manual indexing

New ALMCO VIBRASHEEN

New Vibrasheen method is particularly suited for fast burr removal and finishing hard-to-reach internal crevices. Vibrates a 5 cu. ft. load . . . uses scrubbing action to do the job in fraction of time needed in ordinary operations. Smaller and larger models also available.



Container pivots 120° to facilitate loading and unloading

ALMCO *has the right New* BARREL FINISHING EQUIPMENT *for you!*

New ALMCO Roll Barrels



One man operates entire Roll Barrel System. Makes low-cost barrel finish available to any deburring and finishing department!

New ALMCO Super Mite



Small in size, big in performance . . . that's the new ALMCO Super Mite! Ideal for labs, job shops, research departments and manufacturers with limited finishing needs. Handles close tolerance jobs and low micro-inch finishes; speedily does all deburring and finishing work. It's the new answer to low-cost, small-lot barrel finishing!

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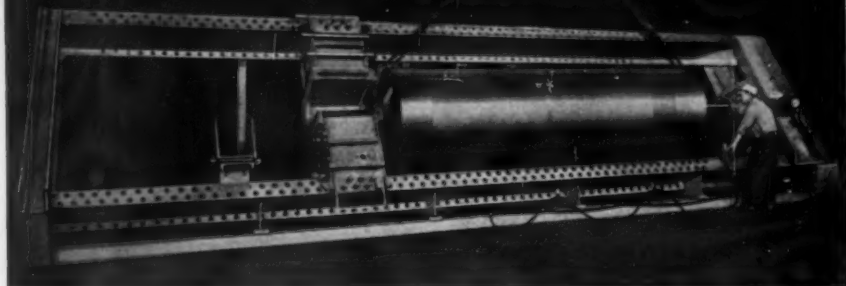
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features in this issue



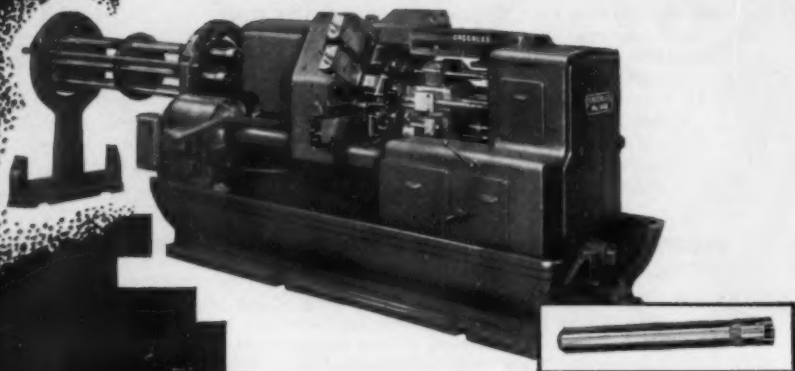
DESIGN HINTS FOR SUCCESSFUL CARBIDE DIES—You can ruin an otherwise excellent carbide die simply through poor design practices. Although design and construction methods used with carbide dies are generally similar to those used with high-carbon, high chrome dies, enough difference exists to influence the success or failure of the die. Here are some splendid hints for the manufacture and design of better carbide dies. The author, Robert C. Nutting, is chief engineer for Harig Mfg. Co., important and leading die builders.Page 133

FOUR COLUMNISTS—This month Harry Conn discusses Drilling Thrust and Torque. Tool breakage, warpage, scrap and short tool life may be avoided with a clear understanding of drilling thrust and torque. This basic information, as well as method for computing, is the subject of the article. Paul Prikos, in the Practical Diemaker, Estimates a Draw Die. These can be a real headache if some of the small, important considerations are ignored. Dennis Jones discusses some unique solutions to multiple-point tooling problems using throw-away carbides. Processing a Gear Plate is the subject of Allan Young's column on Process Engineering. What are the considerations involved? How can these processing problems be solved and how must the job be properly attacked-Pages 87 to 104

HERE'S HOW YOU CAN MACHINE GLASS BASE LAMINATED PLASTICS—This article should be of interest to all who are encountering the problem of machining these materials for the first time. Those who have had experience with them may find several hints to help them do a better job. This article, by E. C. Graesser, is the result of over 20 years' experience with these glass laminated plastics. Because there is danger of splitting, clamping should be one of the prime considerations in doing a better machining job.Page 107

HOW PARSONS BOND HELICOPTER BLADES—Whirling helicopter rotor blades exert a tremendous centrifugal pull against the root-end coupling. Adhesive bonded laminations help distribute this load over a large area of the blades. Methods of bonding, explained with the help of numerous photographs, make this a highly interesting and informative article.Page 115

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2



By **William F. Schleicher**
Vice President, Editorial Director
Hitchcock Publishing Co.

• Last month we had the pleasure to be the after dinner speaker at a symposium on fasteners sponsored by the Extension Division of the University of Wisconsin at Madison. Symposiums, forums, workshops and other meetings which enable many people

of like interests to gather together and learn something are always important, especially to a dumkopf editor; however, as learned as the formal meetings may be, we always absorb more ideas from idle conversation after, or during, the meetings. This Madison adventure was no exception. Bill Waltermire of Lamson and Sessions decried the trend of American business to be overly concerned with merchandising and sales. "There seems to be the idea that business must sell through gimmicks and merchandising and restyling and change rather than through the intrinsic value of the product. In other words, should we not be concentrating more on a better product, better engineered and improved and then sell it rather than spending time and money to find a cute way to sell the same old thing? Foreign competition is serious because their emphasis is on product rather than sales; they've come up with some clever engineering ideas. The thinking of their management, in all of the companies with which I've visited over a period of time, are engineering and product conscious. They believe sales and profits follow on the heels of good merchandise. Engineering is held in higher esteem in other countries."

Harold Storch of Federal Screw has been active in the automotive industry for more years than he cares

to admit. He felt that too many decisions in the automotive companies are made by sales-minded and by economy-minded management which militates against the development of the automobile. "Really, what new engineering have we found on our automobiles in the last 15 years compared to the developments which were fathered by the automotive pioneers? This is not because there are no good automotive engineers today, it is merely that engineering is suffocating under the blanket of sales, economy, merchandising and styling. This is the prime reason why the foreign cars have gotten their foothold."

Because these gentlemen and others with whom we engaged in conversation are primarily fastener manufacturers, the talks, naturally, revolved around the nut, screw and bolt. Some fantastic and ridiculous things came to light during the meeting in Madison. For instance, one of the large automotive manufacturers likes to buy fasteners on price, as silly a thing to do as can be imagined; however, because a low price generally carries with it low quality, the automotive buyer insisted on 100% inspection of the screws. So they hired 25 inspectors who do nothing but inspect incoming screws. Maybe they should try buying from a reputable supplier. Some of the buying practices of the automotive industry are weird and wonderful to behold and we are not surprised to learn that many companies ignore requests for information from the automotive people.

Of importance to industry in general were the observations made regarding the use of fasteners. For many

years considered the chicken dirt of a product, industry is taking a long second look at the lowly nut and bolt and is finding that here, and in assembling truly, is an area where tremendous savings can be achieved. There is a greater awareness of the importance of fasteners than ever before. Interest in the subject is mounting. Bill Waltermire said, "For many years we've batted our heads against the engineering and design departments to make the fastener and the method of fastening a vital consideration in the cost of making the product and in the final reliability of the product; it appears that industry is on the threshold of listening to the fastener manufacturers." Harold Storch added the observation that too many companies are still assembling by hand rather than by machine because they have never seriously considered the fastener as important. "Industry must realize how important fasteners are and how much money can be saved through proper selection of the fastening means and the best method of assembling."

● Harold R. Nissley, who winds up a series of 12 articles on Industrial Management in this issue, writes from Tokyo about some of his experiences after touring seven widely scattered factories and talking with the top managements and chief engineers. In a letter dated Nov. 8, Harold, who's staying at the Marunouchi Hotel, Tokyo, Japan, writes: "One factory with only 200 employees has a statistical quality control system that would do credit to most American factories with a thousand or more people."

• • •

By **Dennis G. Jones**
Kennametal, Inc.

3

CUTTING TOOLS



YOU CAN SOLVE DIFFICULT TOOLING PROBLEMS WITH CARBIDE THROW AWAYS

■ The application of the throw-away insert principle to specialized multiple-point tooling offers some unique solutions to difficult tooling problems. In many cases the use of the throw-away insert concept in multiple-point tooling represents more than just a tooling change. Such a concept frequently combines several operations, thereby changing the whole production operation procedure. For example; facing, boring and chamfering are readily combined. In other cases it is possible to combine turning, facing and chamfering. In fact almost any combination of lathe operations can be performed with a single shank, multiple-point, throw-away insert tool; although some are impractical and can be done more economically with a combination of special and conventional tooling.

The operation into which this type of tooling fits most easily is that of boring. In the case of through boring a single diameter a simple bar can be designed that will incorporate two inserts, one for roughing and one for finishing. In fact, this design can be refined to permit the roughing insert to complete its cut before the finish insert begins. This permits a time interval for the machine tool to automatically change speed and feed which will result in higher production rates and better surface finishes often required in bores. The roughing insert will probably be a grade of carbide suitable for such an operation

CREATIVE ENGINEERING

CUTTING TOOLS continued

whereas the finishing insert can be a harder, longer wearing grade. The roughing insert can be a non-precision, utility type and the finishing insert a precision ground, accurate-indexing type.

Where there are several diameters in the bore, the boring head or bar can be designed so that each insert produces a required diameter. Chamfering inserts can also be included, and in cases where the workpiece

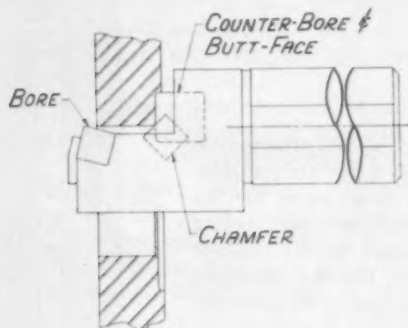


Figure 1.

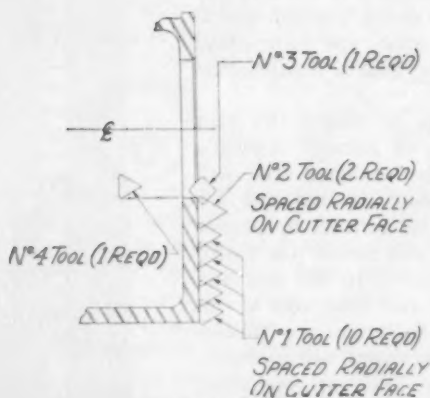


Figure 2.

dimensions will permit, an insert for facing the end of the part can be used.

Figure 1 shows a schematic of a boring bar design using throw-away inserts to bore, counterbore and chamfer in one sequential operation. Three square inserts were used in this design. The insert that was used to produce the counterbore also formed a 1/16" radius at the bottom.

The cutting edges of these three inserts had to be located within a 1" axial space and were therefore spaced at different radial positions on the bar. This design demonstrates the compactness obtainable with this type of tooling.

An even more unique application of multiple-point tooling is shown in figure 2. In this design fourteen inserts are used to face, bore and chamfer the part. This tool completed the machining of one side of the part in a single operation. Previously the operation required both milling and boring. Obviously two machines and two set-ups were required. The new tooling reduced machining costs to less than one-fourth of the previous cost.

The multiple-point, throw-away insert tooling principle has an almost limitless number of possible variations. Two or more inserts can be mounted in a single turning tool for rough and finish turning. This same idea can be used to remove a great amount of stock in a single pass with a final finishing pass as a separate operation.

In those situations where the part size is small and there is not sufficient space for clamps, an insert with a countersunk hole can be utilized. The insert is held in place with a screw. This approach permits use of the

CUTTING TOOLS continued

throw-away insert in bores that are only slightly larger than the insert itself. The clamped-on and screwed-on inserts can be used in conjunction with each other, again as a solution to space requirements.

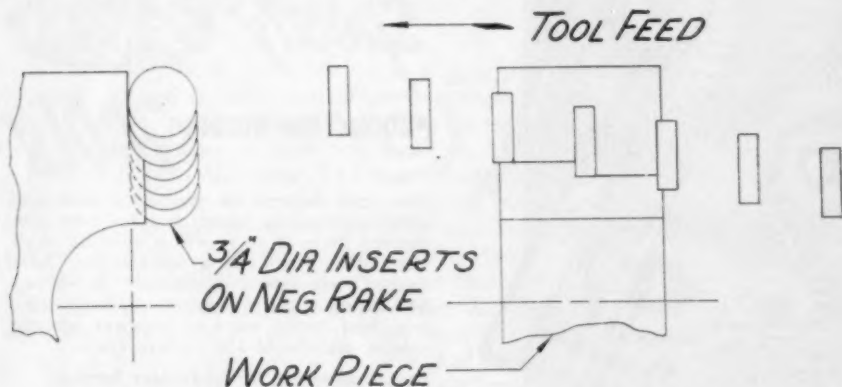
An interesting application of multiple-point, throw-away insert design is shown in figure 3. This design is used in a generating type surface broaching operation. The previous brazed blank design was costly and inconvenient. The throw-away insert solution to this problem resulted in a savings of such magnitude that the new tooling was amortized in less

than a month.

There are many other examples of how throw-away insert tooling has been incorporated in multiple-point design to reduce costs and increase production. Tooling and production engineers should look closely at machining jobs on which two or more single-point tools are being used or where more than one operation is required. Many of these jobs could be done with one multiple-point, throw-away insert tool, in one operation. In most cases you will find that multiple-point tools produce multiple benefits.

• • •

Figure 3.



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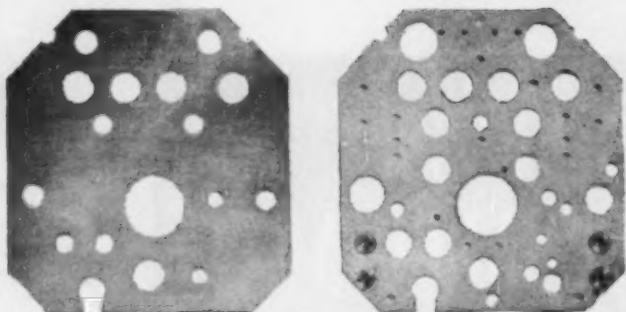


CREATIVE ENGINEERING

PROCESSING A GEAR PLATE

■ To properly process parts similar to a gear plate for production, extensive study and detailed analysis of the piece-part in question are necessary. These plates usually involve the production of tight tolerances on hole location as well as hole diameters. The gear plate illustrated in Figure 1 is a good example of this type of part. The plate is shown as it comes from the pierce and blank die in the left of the photograph, and the finished part, complete with pressed in bearings, is shown at the right.

The first consideration the process engineer has to make in deciding the proper sequence of operations to produce this part, is to determine which are the close toleranced holes, both on diameter and location, which have to be bored. Since two types of dimensioning are used, rectangular co-ordinates and hole center spacing, this can be best done by tracing the gear train by drawing a line from hole to hole as dictated by the hole spacing chart. This is illustrated in Figure 2. Holes other than those in the gear train also must be bored because of close diameter dimensioning or tight tolerances between holes. These are color coded for identification also. It must also be determined at this point which holes shall be used for location in the various fixtures throughout the production schedule. In this case, two sets of locating holes are neces-



1. This gear plate is an excellent example of tight tolerances on hole location as well as hole diameters. The plate at the left is as it comes from the pierce and blank die; at the right, complete with pressed-in bearings.

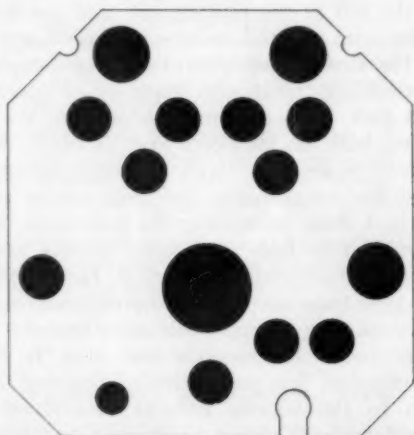
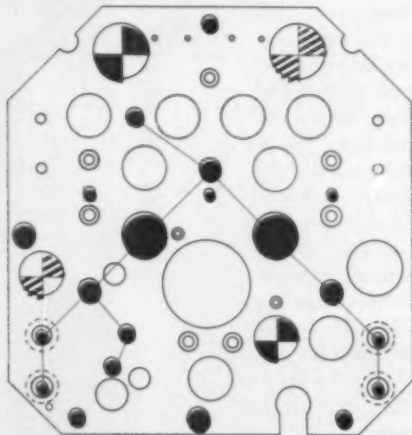
sary. One pair of holes, those coded with diagonal lines, are used in fixturing for drilling and reaming, and the two holes coded in solid color are used in boring. The first boring machine operation involves locating in the di-

agonal line locator holes and boring the "solid" locator holes. These bored holes are then used for location throughout all succeeding boring operations.

Getting back to the first physical

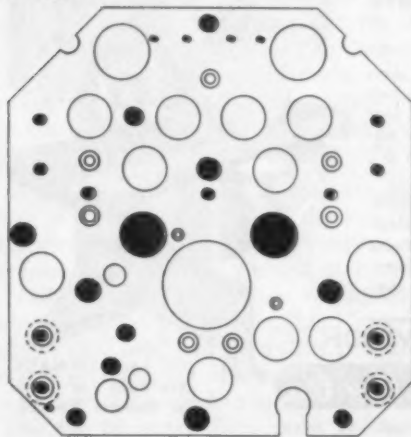
2. Initial boring layout. The straight lines running from hole to hole illustrate location of the gear train. Dimensioning is done by use of rectangular co-ordinates and also hole center spacing.

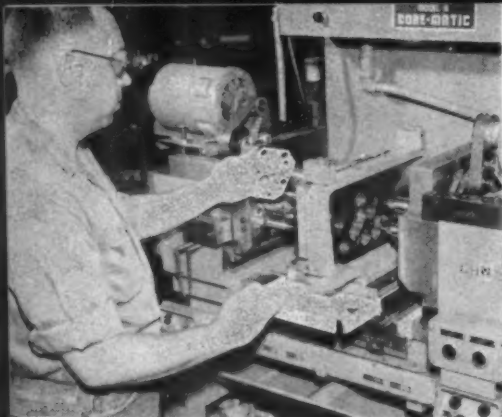
3. Actual operations begin with a compound pierce and blank die. In this gear plate, the colored holes are pierced.



undersize and drilled and reamed later.

5. After the bearings are pressed in place, they are then reamed on location in this second jig.





7. A finished gear plate is inspected by a boring machine operator.

are too close together to be drilled in one jig, two drill and ream jigs are required. The holes to be drilled and reamed in each jig are determined and color coded in Figures No. 4 and No. 5. Note that the holes for the bearings are drilled and reamed in

the first jig, the bearings are then pressed in place, and then reamed on location in the second jig.

A final boring layout is prepared based on all the above procedures, providing information as to what the various hole sizes will be when the parts reach the boring operation, as well as what the final dimensioning will be for both hole sizes and hole spacing. A portion of this layout is illustrated in Figure No. 6.

A photograph of the operator holding the finished gear plate at the boring machine appears as Figure No. 7.

Extensive study and detailed analysis of each part are imperative to produce parts of this accuracy and quality, and the process engineer is required to give his best ability and much time and trouble to accomplish this goal. . . .

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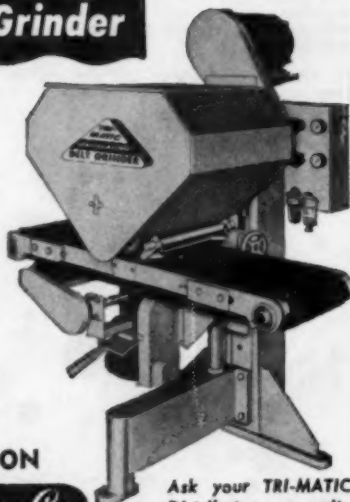
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By **Harry Conn**
Scully-Jones & Company

5

ENGINEERING and TOOLING



DRILLING THRUST AND TORQUE

■ There are many occasions for the use of the knowledge of torque and thrust when designing tools, jigs, machines or even the product being manufactured. Tool trouble-shooters, methods engineers and process engineers can avoid many pitfalls such as tool breakage, piece part warpage, scrap and short tool life by being informed as to their amounts, relationships and methods of computation.

As examples of the use of this knowledge, how much thrust should your hydraulic cylinders or mechanical feed provide when drilling 17 holes of $\frac{1}{2}$ size through 1020 steel with .008 feed per revolution when all the drills are dull? Or what percentage of my needed horsepower will be consumed by thrust? Or if I increase my feed per revolution what effect will it have upon torque? Or what clamping pressure is necessary?

From figure 1 you can choose the size of your drill as listed at the top, choose the desired feed per revolution on the left side in inches per revolution, then in the following manner obtain the amount of torque. As an example a 7/16 drill at .009 feed per revolution is determined by projecting downward from 7/16 and projecting to the right of .009 feed and where the projected lines cross, the amount of torque is indicated on the slanting line as 10 pound feet. These torque figures are for drilling SAE 1020. When the projected lines meet in between the slanting

CREATIVE ENGINEERING

lines the torque values can be determined by interpolation.

Drilling thrust can be determined from figure 2 by the same process. As an example locating a $\frac{3}{4}$ in. drill in the vertical column and projecting downward to a horizontal line projecting from .009 feed per revolution on the left. The line from .009 feed and $\frac{3}{4}$ drill meet on the slanting line which represents 1000 lbs. of thrust.

It was found in a series of drilling tests (S.A.E. Journal, March 1931) that torque and thrust are affected but little by a change in cutting speed. The power, however, is a direct function of the speed.

The power at the point of the drill operating at a given speed is made up of the two factors, thrust and torque. In power computations thrust can almost be neglected because only about 1 percent of the

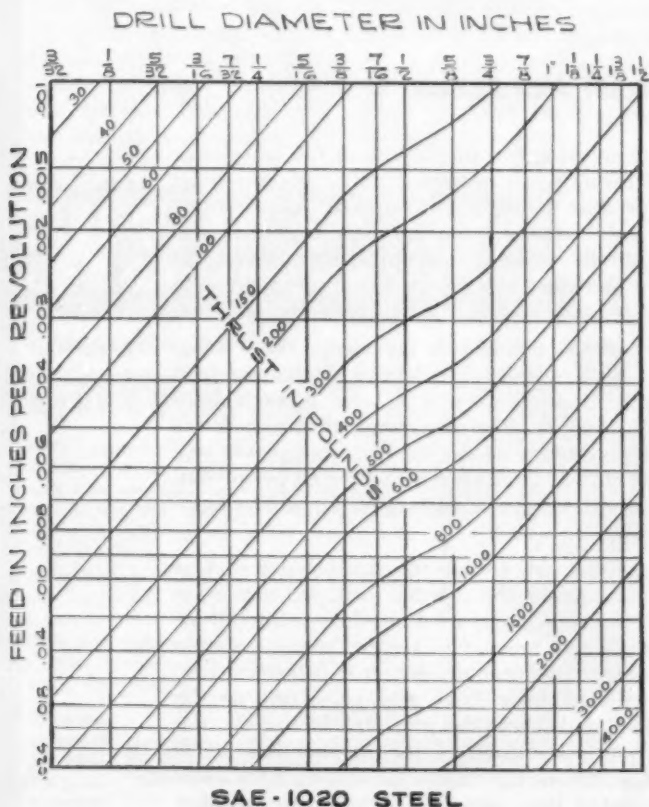


TABLE I

SAE Steel	1020	1035	0.97% C	3150	1112
Torque Factor	1.00	0.90	1.06	1.15	0.69
Thrust Factor	1.00	0.91	1.18	1.00	0.77

power is consumed in creating the necessary thrust.

The factors for obtaining torque and thrust for other steels from those for SAE 1020 as shown in figures 1 and 2 may be obtained from table 1.

The effect that cutting fluids have upon drilling thrust and torque can be determined by using figures 3 and 4. (ASME Transactions, February 1936). From these figures, the cutting fluid giving the least torque or power and the least thrust can

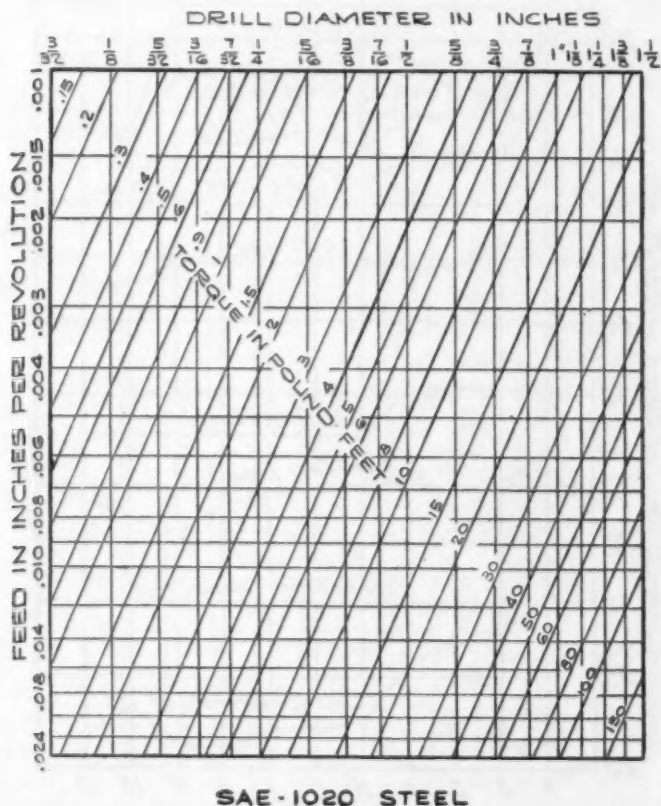


TABLE 2

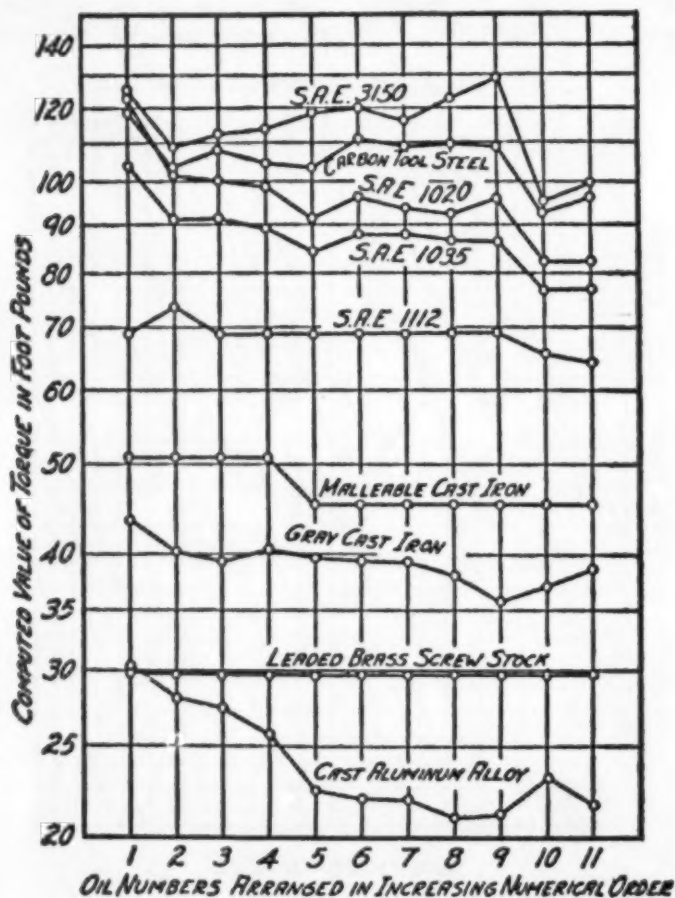
- | | |
|---|--|
| 1. Dry cutting. | 6. A light mineral oil. |
| 2. Water containing 1 1/2 per cent borax. | 7. A heavy mineral oil. |
| 3. 1 part soluble oil to 50 parts water. | 8. A light mineral oil containing 10 per cent lard oil. |
| 4. 1 part soluble oil to 10 parts water. | 9. A light mineral oil containing 5 per cent oleic acid. |
| 5. A No. 2 lard oil. | 10. A sulphurized mineral oil. |
| | 11. A sulphurized lard-mineral oil. |

be readily determined.

Table 2 shows 11 different cutting fluids that were used during

the test necessary to plot figures 3 and 4.

The comparison of torque values

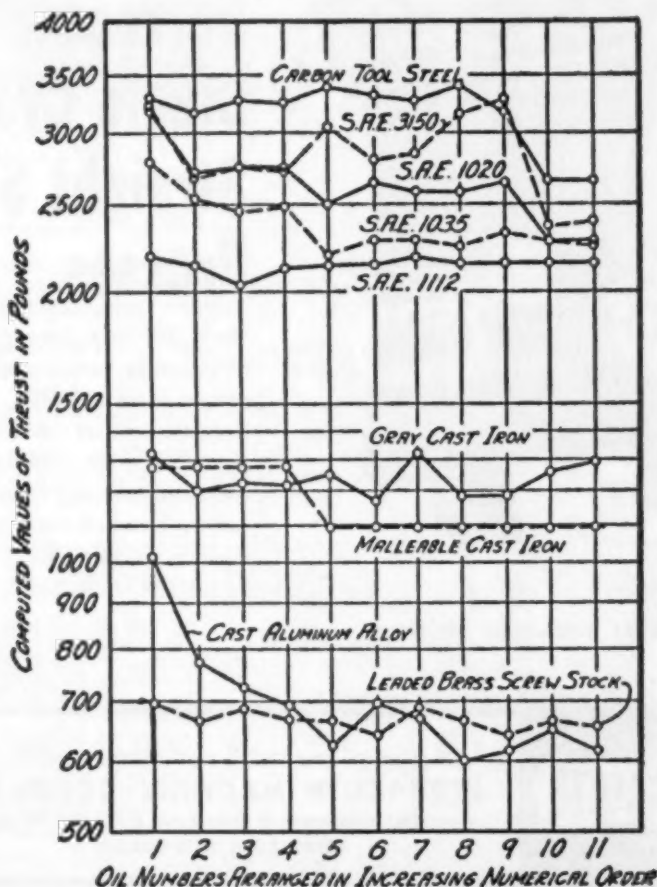


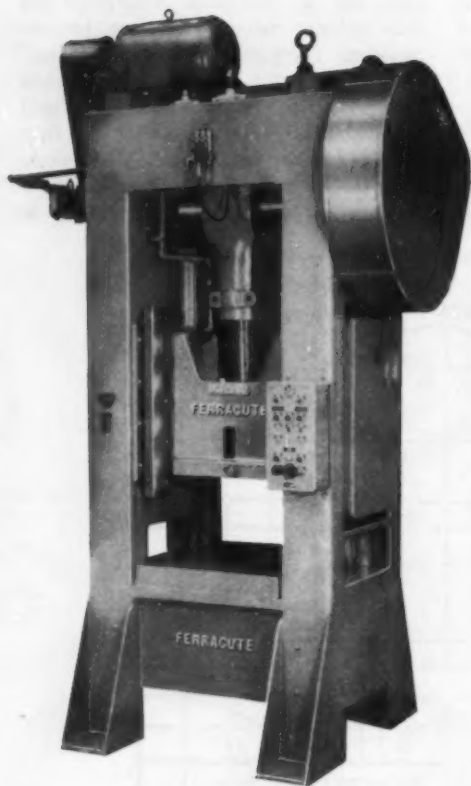
for 1¼ inch diameter drills using 0.015 inches of feed per revolution at 60 feet per minute and cutting several non ferrous and ferrous metals with the 11 most commonly used cutting fluids are shown in figure 3.

All of these tests were run with conventional chisel point grind and it is conceded that there are drill grinders available that can grind

drills to reduce these values. This article was intended to arouse interest in drilling torque and thrust and for a complete treatment of this subject two books are recommended. They are "Metal Processing" by Orlan Boston, John Wiley & Sons Publishers of New York City and "Drills and Drilling Practice" a fine book published by National Automatic Tool Co., Inc., of Richmond, Indiana.

• • •





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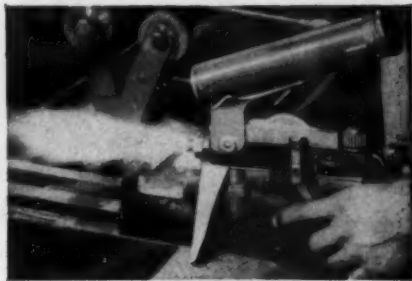
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THE PRACTICAL DIEMAKER



CREATIVE ENGINEERING

ESTIMATING A DRAW DIE

■ Draw dies are a specialty field and can be a real problem to anyone who is devoid of the small tricks of the trade. Many a draw die has become a real headache due to a lack of some small draw diemaking application. Small but important applications, such as: draw filing the radii in the proper direction; not having a small flat at the bottom of a cup; perhaps in certain instances even roughing the draw punch to pull the material down avoiding thinning out; die construction having too weak a draw ring and many other combinations that only an experienced draw diemaker knows can lead to success or failure. Factors outside the die itself, such as speed of the press, draw-compound, and the draw qualities of the blank or piece part material, affect greatly the successful production of drawn parts.

Fundamentally, the difference between the draw and form dies is that a *draw die* takes a blank and makes it into a leak-proof four sided or completely round object. The *form die* flips up the sides and because they are not solid in the corner, there is no physical restriction when doing this. The draw shell will, if stretched too far, either thin out at the corner or crack open. While this definition is not academic, it suffices to evaluate different type dies for estimating purposes.

For a typical estimating example let us take Figure I. Usually this is done in a combination blank and draw die—Figure II.

The best approach to this draw die is to figure that one part is cutting, another drawing. It's something like figuring two dies squeezed into one. Here again we encounter the "guestimate" of the time the diemaker must use to develop the blank by doing a certain amount of blank development, making handmade cut-out samples, adjusting spring pressure or air cushion, radii stoning, polishing and the like. Don't be caught short on this estimate in hours because a new coil of draw quality steel may react differently and the diemaker is forced to touch up the die here and there.

In draw die estimates be certain to check the shell piece part drawing for radii that may be too sharp and the thickness of material. The thinner the material used, the more likely it will tend to crack in the shell form. This is only logical. How much can you thin out say, .010" thick material? The elasticity of .030" or .060" is much greater and will therefore draw better over a radius without cracking.

A generalized quote overall for a

problem shall be in the neighborhood of 100 hours. The die is on an 8" x 8" die set.

Here is the breakdown:

a. Stripper	5.0	Hours
b. Cut and draw punch ..	12.0	"
c. K. O. Pad could be positive through shank	5.0	"
d. Cutting die ring	15.0	"
e. Draw punch (Pilot or post)	5.0	"
f. Bushing	5.0	"
g. Draw ring	8.0	"

	55.0	Hours
Mounting	20.0	"
Develop time	10.0	"
Troubles	10.0	"

TOTALS 95.0 Hours
IN DOLLARS

Material\$135.00 Die set & Mtl.
Build

\$7.00 @ 95 = 665.00

\$800.00

Our example is set for only one draw. Say the shell was deeper and required another draw. Take about 25% off the first die price due to the cutting member and your estimate should not be out of line.

I should also like to explain that in my estimate for blank development,

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PRACTICAL DIEMAHER continued

consideration must be given to the analysis of the shell by the diemaker before releasing the die. He usually will make up the blank shell with a series of scribed lines both vertical and horizontal when the blank is in the flat. After drawing the sample blank, these lines will move with the draw on the radius and have a sort of swirl or parabolic curvature. The distances the squared scribed lines have stretched are observed and must be uniform about the radii, otherwise the die is not balanced or lined up properly with correct clearance on all sides. Further the diemaker will saw the shell in half to see how his corners have thinned out and further ascertain needed changes in die construction.

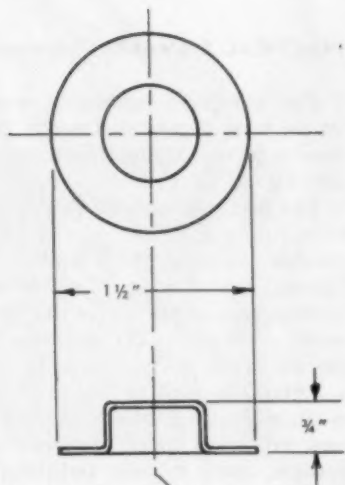
Using as examples Figures I and II we can further add small changes to the drawn shell without much additional cost.

For example, adding a punch pad with a round $\frac{1}{4}$ " perforator would cost an additional 8.0 hours. If we desired three such perforators we would increase the die cost by a total of 13 hours.

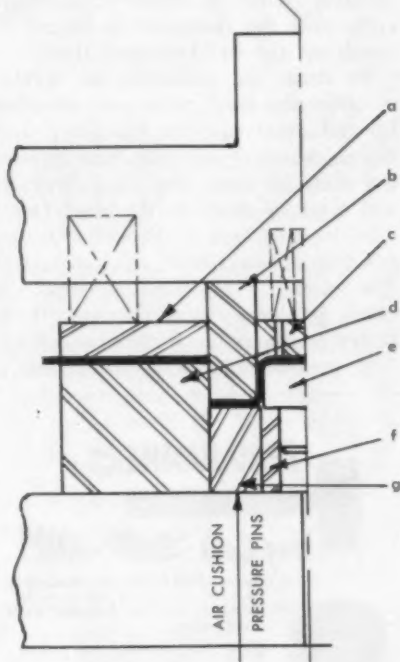
Let us say we desired one or three debossings about $\frac{1}{4}$ " diameter, the relative cost would approximate the above additional perforator cost.

We assume the above addition for perforated openings or debossings will be on the crown of the shell, not the flange, which is moving. Incidentally, this debossing and perforating is done at about the bottom of the stroke to avoid stretch or elongating of the holes and debossings.

Next month an estimate will be made of the progressive die for a strip layout. • • •



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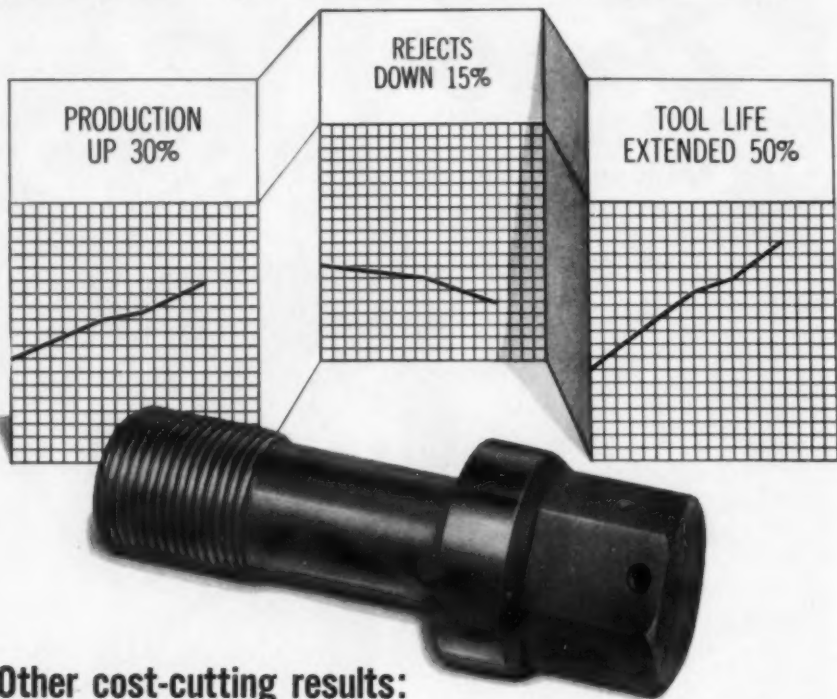
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HERE'S HOW YOU CAN MACHINE

GLASS BASE LAMINATED PLASTICS

by **E. C. Graesser**, Chief Engineer Quality Control and Standards
National Vulcanized Fibre Co.

■ Over the years specific techniques have been developed for the successful machining of glass base laminated plastics and, at this date, most problems have been resolved. The following basic recommendations for machining should be of interest not only to those who are encountering these materials for the first time but perhaps even to those who have already had some experience in machining glass base laminates.

It is important to bear in mind that when machining these materials parallel to the laminations, there is always the danger of splitting. This problem can be virtually eliminated if the piece is firmly clamped during machining and if care is exercised during cutting operations. In many cases, the same machining operations employed in the fabrication of metals and wood may also be adapted to glass base laminates. However, certain slight changes in tools and the use of proper speeds are necessary. The following observations are a result of the writer's 20 years of experience in dealing with glass base grades of Phenolite laminated plastic.

7

BLUE BOOK MEASUREMENTS



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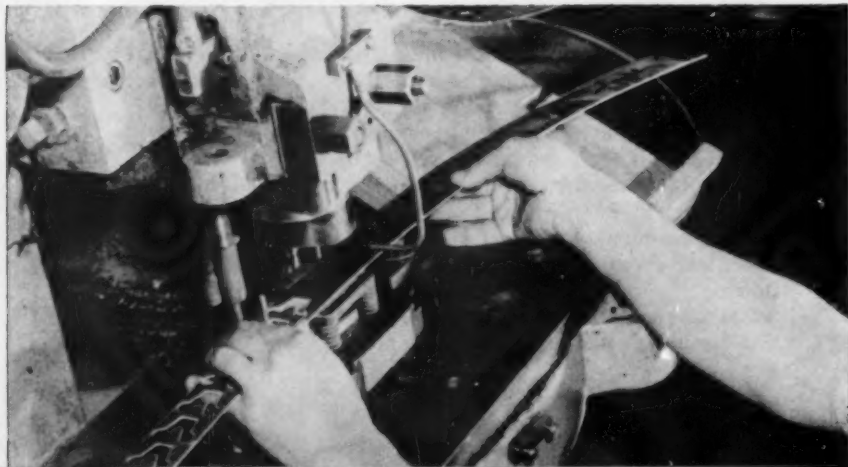
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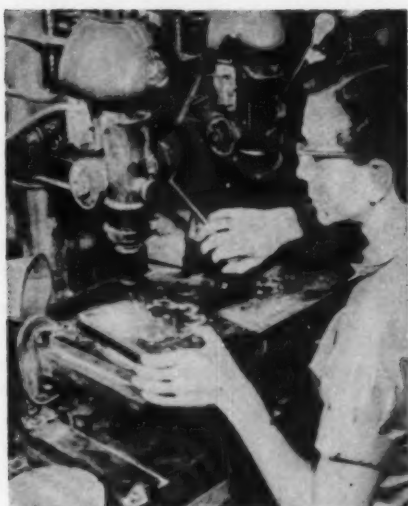
Sawing with Diamond Wheel

A diamond impregnated wheel with copper body 1/16 in. thick and 12 in. dia. run at 3000 to 3600 rpm will give good results cutting dry with a

good exhaust system. The material is fed by hand into the saw as fast as it will cut without forcing the saw. Idling creates friction and heat, which cause excessive dulling and burning. A flood of water on the work and

2. Punching glass base material. Sheets up to 3/32 in. can be punched with good results.





3. Drilling glass base laminate part. Carbide drills are used with spindle speed of 4800 rpm for $\frac{1}{4}$ in. drill.

wheel can be used when necessary to prevent overheating. Abrasive wheel cutting under water is also recommended.

Band sawing is one of the most difficult and expensive operations. For good results, steel blades with hardened teeth and a soft back can be used. Work should be fed lightly and the blade should be kept sharp. Diamond coated band saw blades are now available and are superior to steel. Sawing can be done dry with a good exhaust system.

Shearing and Slitting

Thicknesses up to $\frac{3}{32}$ in. can be sheared and slit. The same standard practices are used for shearing and slitting laminated plastic sheets.

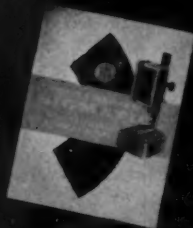
Punching

Punching practices for glass base materials are the standard ones used

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for laminated plastics generally, although die life is shorter. The use of carboloy and special die steels will help to increase die life. Sheets up to 3/32 in. thickness can be punched with good results.

4. Tapping operation is much the same as for paper base grades. Coolant can be used, but is not necessary when good exhaust system is available.



Drilling

When drilling these grades, a carbide drill should be used. The materials can be drilled dry with a good exhaust system to remove dust. A flood of water on the work and drill can be used when necessary to prevent overheating and dulling of drills. High speed drills, nitrate treated, can be used, but must be sharpened more often. Care should be taken when sharpening so that the drill is cut back far enough to the original body diameter of drill. Spindle speed for these grades is 4800 rpm for 1/4-in. dia. drills.

Tapping and Threading

The methods for tapping these materials are much the same as for tapping paper base laminated plastics. The abrasiveness may cause taps to



5. Threading, both internal and external, can be done on a lathe. Fine cuts should be taken for best results.

cut very close to size, resulting in a tendency toward binding when backing out. Standard high speed steel taps can be used on short runs. For any sizable quantity, carbide taps should be used. Taps should be pur-

chased oversize. Coolant can be used, but is not necessary if a good exhaust system is available.

Threading

External threads and internal threads can be cut dry on a lathe with a carbide-tipped tool. Fine cuts should be taken to give best results. A coolant can be used, but is not necessary.

Machining

Conventional machining, such as turning, boring, facing and milling of these grades, can be done on automatic screw machines, standard and production lathes, hand turret lathes and standard milling machines. Carbide-tipped tools and cutters should be used with surface speeds below those used for paper base laminated plastics. Tools should be ground with a zero rake and machining can be done

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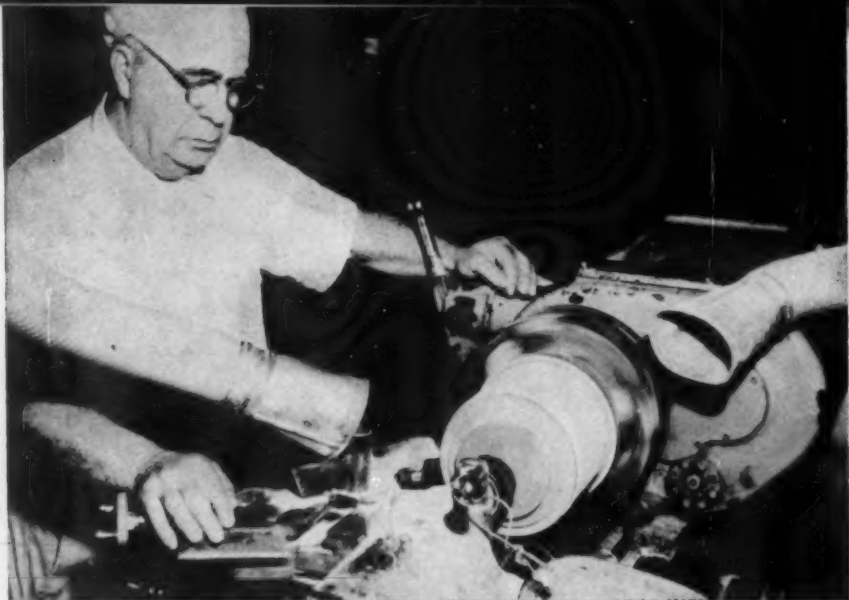
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6. Turning glass base tubing on standard lathe. Machining operations such as turning, boring, facing and milling can be done on standard metal working machines using carbide-tipped tools and cutters.

dry with an exhaust system to remove the dust. A coolant can be used, but is not necessary.

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melamines and phenolics, are being introduced. The progress in machining of glass base laminates is timely and continuing. Techniques are being refined almost daily so that glass base machined parts, though impossible in the recent past, can be turned out with speed and perfection, if operators are kept up to date with new and changing techniques. • • •



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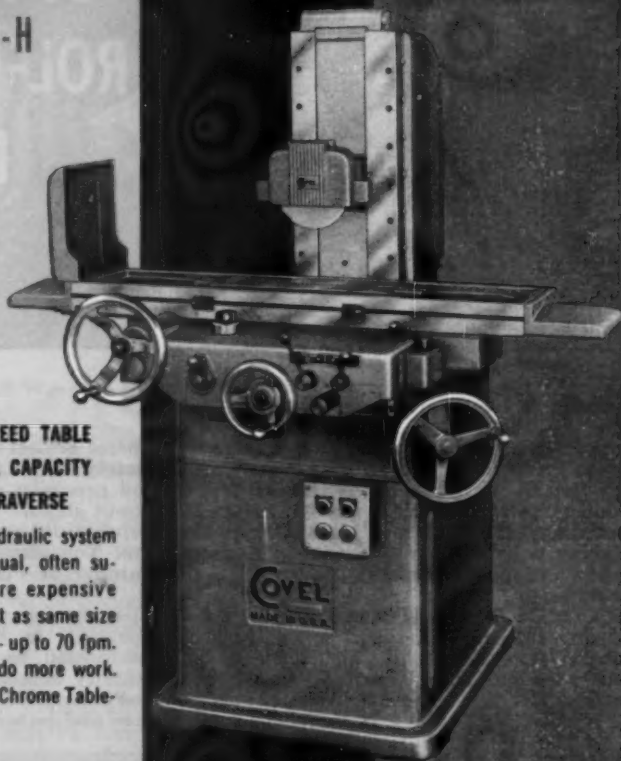


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HOW PARSONS BOND HELICOPTER BLADES

by **Darrell Ward**, Engineering Editor

■ When John Parsons was faced with the problem of building up laminated parts on metal helicopter rotor blades by adhesive bonding, some people said it could not be done. But this kind of reception was nothing new to the man who invented numerical controls for machine tools and saved thousands of dollars on the cost of production at crucial periods during World War II.

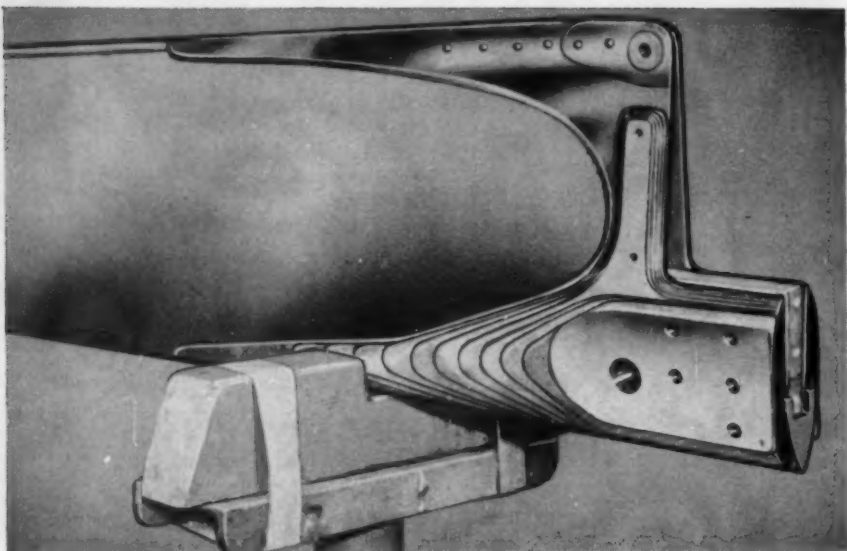
Adhesive bonding of metal parts to comply with specifications was not the only challenge, nor the worst that John Parsons faced. A long and intriguing personality story lies behind all this, but, for the moment, immediate interest can be focused on the highlights of a very successful method of bonding.

The Parsons Corporation, of Traverse City, Michigan, began its activities in the aircraft field in 1943, when it initiated the manufacture of the Sikorsky R-5 helicopter rotor blades. The company is one of the oldest in the industry in adhesive bonding of primary aircraft structures. This method of assembly has been utilized at Parsons

8

BLUE BOOK FEATURE

BONDING HELICOPTER BLADES continued



This is the root-end assembly after bonding and other operations. Root doubler and aft doubler in conjunction with the laminated assembly distributes stress loads on blade very efficiently.

1. A metal blade spar, consisting of leading edge with shear web and doubler silver-brazed together, begins first step in adhesive bonding. Economical gloves are used to protect surfaces as the unsupported sheet film adhesive is applied to the doubler. The steel part requires vapor cleaning, then priming and pre-heating to make film adhere.



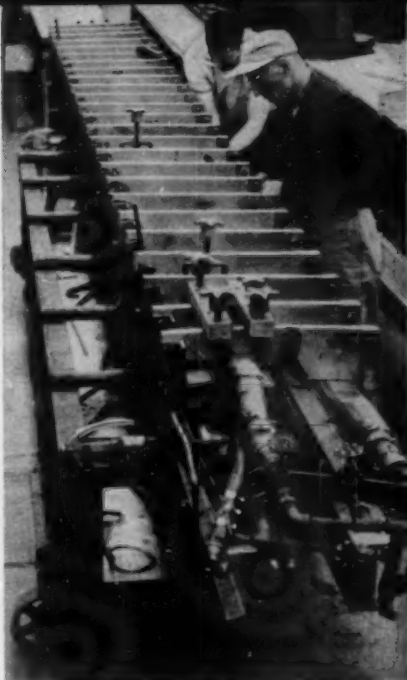
on a production basis since 1945.

Parsons routinely bonds metal to metal, wood to metal, metal to fiberglass, wood to wood, fiberglass to fiberglass, and fiberglass to wood. Most interesting of these is building up the root-end construction on metal rotor blades. Such blade construction includes adhesive bonding of steel to aluminum and aluminum to aluminum, as well as silver brazing of steel to steel.

A typical adhesive material used on the laminated metal parts is Plastilock sheet film made by Goodrich. This synthetic rubber-base phenolic material is used in pre-dimensioned rolls and tapes 0.010 to 0.012 in. thick.

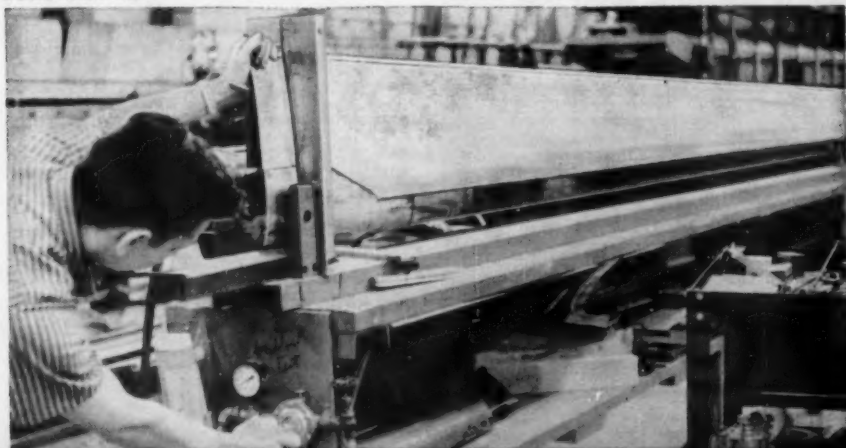
Aluminum parts to be bonded are cleaned with chromic acid, either in a dip tank bath and rinse, or by "paste" cleaning at work stations.

The steel surfaces require a different approach. They are "vapor blasted" in a liquid honing machine prior to both brazing and adhesive bonding. And, because the surface of

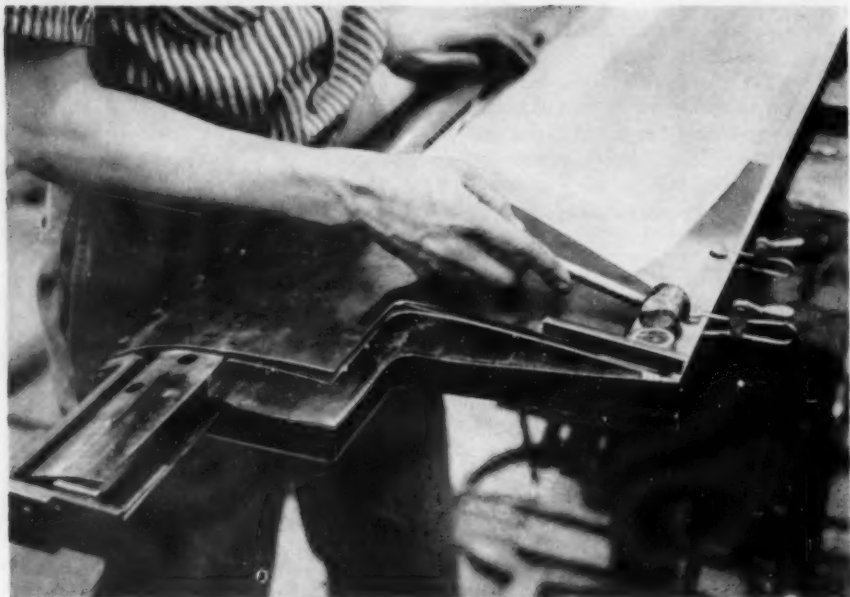


2. Spar, first channel and skins are bonded in a pressure-fixturing prior to main assembly bonding in fixture shown here. All joining surfaces have been chromic acid cleaned with adhesive film applied. Here the pressure-fixturing containing the main assembly is readied for curing oven in far background.

3. When cooled blade is removed from bonding fixture, ends are plugged and air pressure is built up inside the blade to 4.5 psi. This makes the aluminum skin belly-out from the bonded channels somewhat like slightly corrugated sheet. If there is any defect in entire length of bond between channel and skin, the corrugated appearance would show it.



BONDING HELICOPTER BLADES continued



4. A special metal gage is used for locating and dry-fitting the aft doubler, one of the first built-up laminations after the basic blade construction has passed inspection. The parts are held together with quick-clamps.

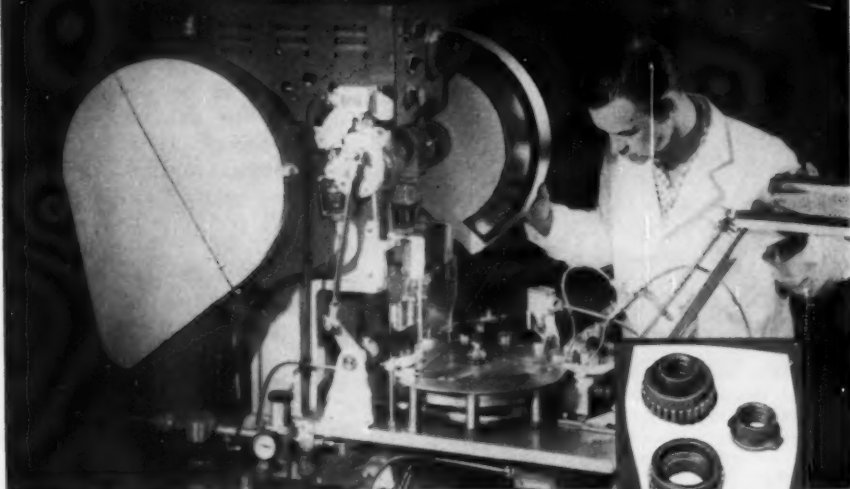
5. Drag link holes and anti-peel rivet holes are drilled with metal template and guide bushings clamped in position over the laminations. The anti-peel rivets eliminate any doubt which may occur on adhesive bonding of parts under unusual stress conditions. Bonding adhesives of various types can be peeled easier than they can be pulled or sheared apart. Rivets inserted at key points do not permit peeling to begin.



steel requires further treatment to provide proper wetability when brought into contact with the sheet film adhesive, it must be primed. The primer used at Parsons is a special formula using Plastilock No. 604 material cut with a blend of Toluene and methyl ethyl ketone.

The company is not satisfied to stand on proven materials and methods alone. Each batch of adhesive is qualified in the laboratory prior to being released for use by production personnel. Every bonding operation in the plant is duplicated on test sections, using the same batch of materials and the same time, temperature and equip-

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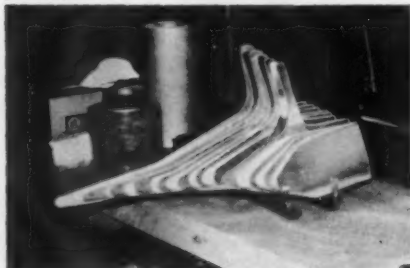
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BONDING HELICOPTER BLADES continued



6. Red crayon is rubbed over surfaces of root doubler to be built up with laminations. Topmost laminate is an aluminum block which exerts uniform pressure down through the laminations and must fit contour of blade perfectly. By rubbing this block over crayon marked surface, high spots can be readily detected and ground off the aluminum block with an abrasive disc as shown here.

7. Here is a complete set of aluminum sheet laminates which bond between the aluminum block and blade skin to make root-end assembly of finished rotor blade. These parts have been cleaned in chromic acid. The laminates are pre-heated in oven to a controlled temperature of 130 deg. Worker, taking one part at a time from the oven, lays up the film adhesive on one side of each. Once the adhesive film is secured to a laminate, the surplus is trimmed to conform to the laminate profile.



ment as employed on the production parts. Production assemblies and components are not released for further processing until the test specimens are checked. Results are evaluated to prove the bond of the parts.

Comprehensive data is tabulated and computed on IBM cards for routine inspections and for permanent files. Because of their unusual IBM system, which we hope to discuss in greater detail for a future article, every batch of adhesive and every production piece using that batch can be identified in a matter of minutes.

8. Building the root-end doubler is a rather complex operation in this fixture. Laminations are located and stacked in sequence, with thermocouples laid in at key points. Assembly consists of 12 laminations on each side of blade, covered with a Teflon blanket. A resistance-type heat blanket goes on top of the Teflon used merely to separate heat blanket from adhesive squeeze-out. Then comes a silastic rubber pressure equalizing pad, an air pressure bag, and pressure retaining plate. The air bag is brought up to 140 psi after the two-sided assembly fixture is clamped.



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BONDING HELICOPTER BLADES continued

Parsons must keep a close check on every part and every assembly that leaves the plant. When they ship a helicopter blade, they are not only conforming to basic Government regulations, they are guaranteeing the structural integrity of the rotor blade.

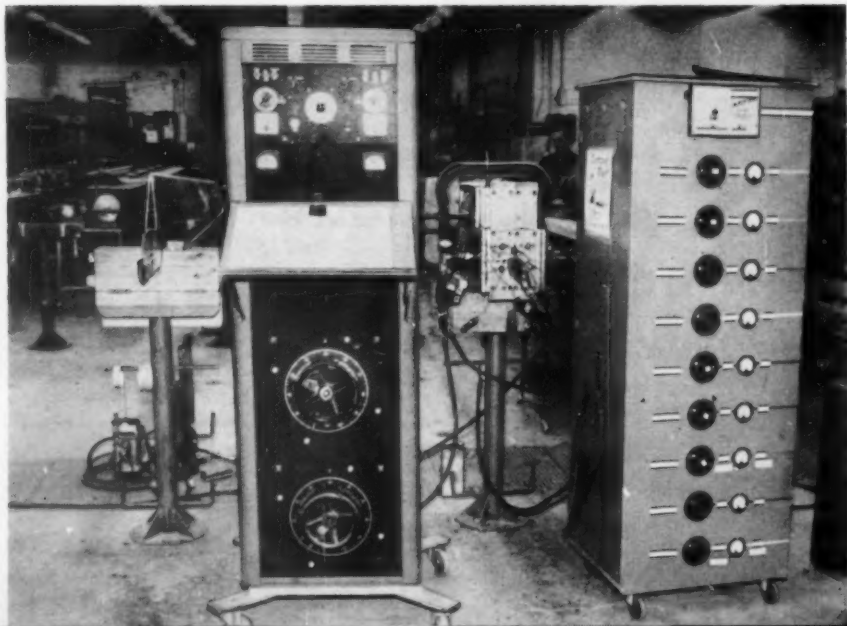
More specifically, as John Parsons explained, engineering of these rotor blades for adhesive bonding methods is concerned with designing a structure to avoid peel load. In the words of people at the plant, "A good glue can be made to bond practically anything." Bonding metal is as simple as bonding many other things, but the

problem is that no matter how much pressure it takes to pull apart or shear under test, they can be made to peel apart with much less pressure.

For example, a bonded joint which will have a shear strength of 3000 to 4000 psi can be made to peel at a load (expressed in pounds per linear inch) of less than 5% of the shear strength.

Where possible, the joint is designed so that peel loads cannot develop. However, in some instances it is necessary to use precisely placed, anti-peel rivets at key points. • • •

9. These control units are connected with the thermocouples and heat blankets in the bonding fixture. The unit at left is equipped with a thermo-selector switch for selectively reading temperatures on each of the 12 thermocouples in the assembly. These are individually regulated to give uniform heat through the mass of parts by rheostat controls and ammeters in unit at the right. A separate thermocouple in the fixture acts as master control for the entire assembly once the 12 units are balanced. Curing of the adhesive takes 90 minutes after balanced temperature is brought up to a range between 300 and 360 deg. F. Pressure is not released on fixture until assembly cools to 180 deg.



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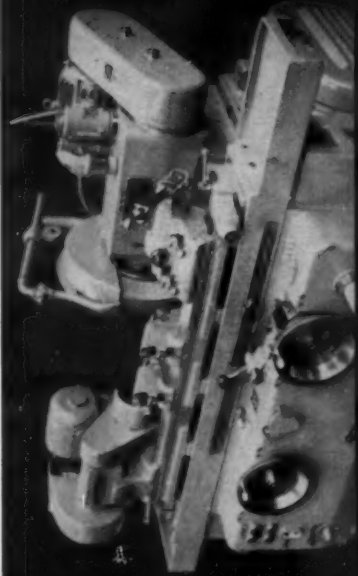
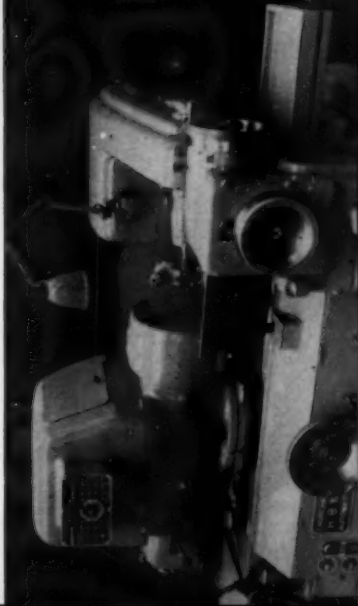
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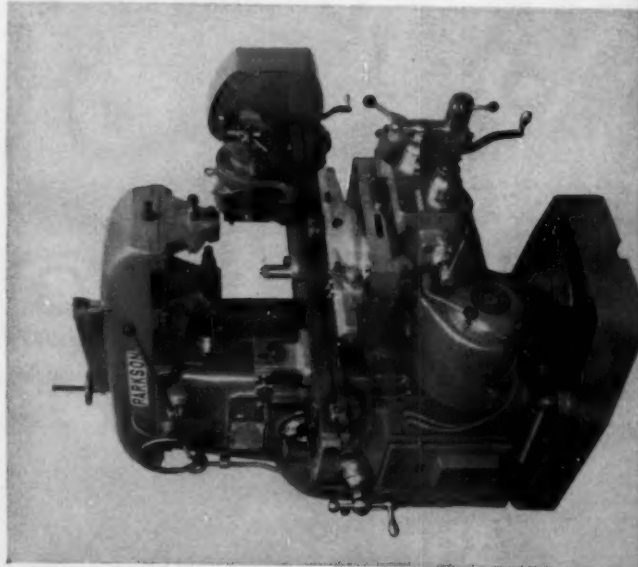
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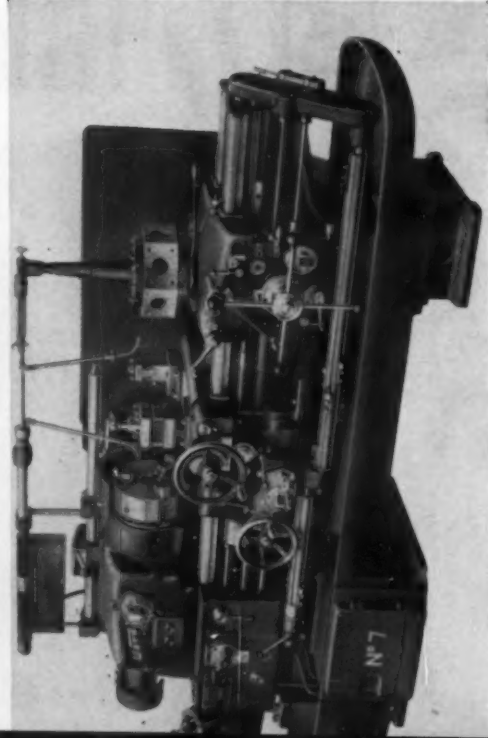
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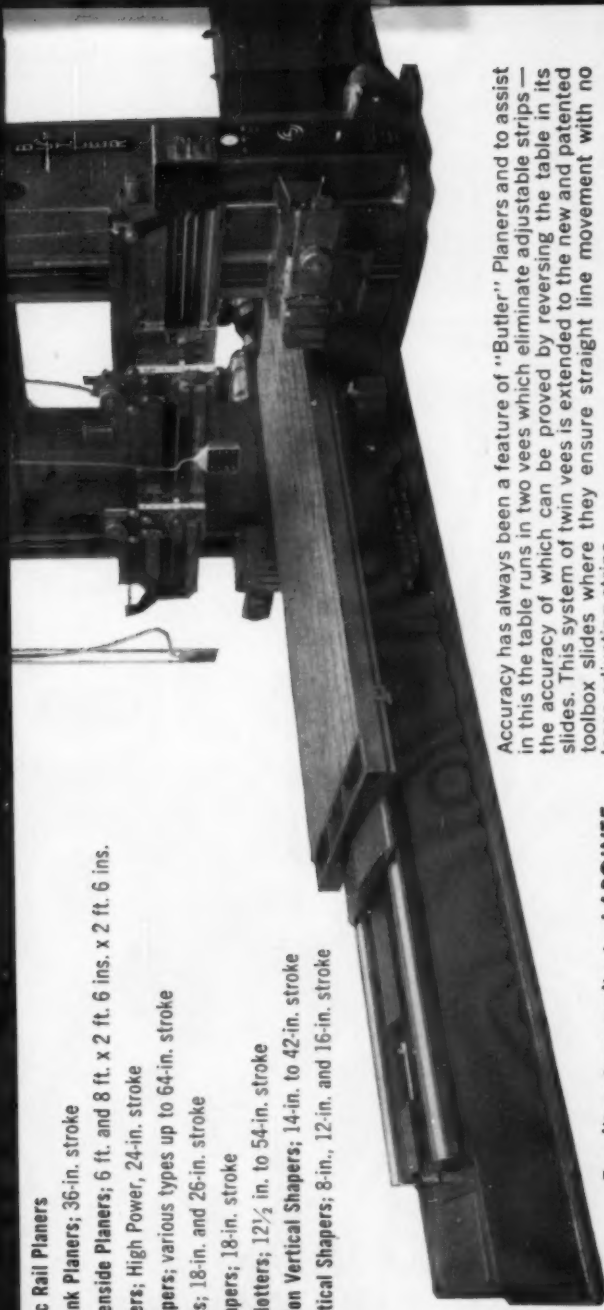
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9

Design Hints for Successful Carbide Dies

By **Robert C. Nutting**
Chief Engineer
Harig Manufacturing Co.
Chicago, Illinois

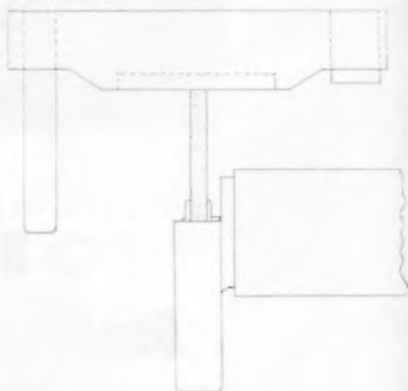
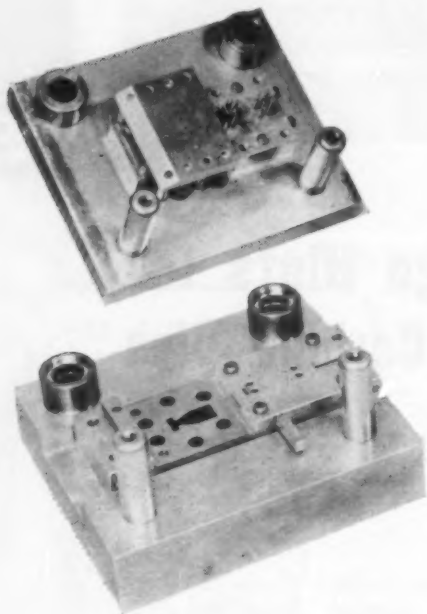
■ Poor die design practices can do much to ruin an otherwise successful carbide die. Although design and construction methods used with carbide dies are generally similar to those used with high-carbon, high-chrome dies, there is enough difference to influence the success or failure of the carbide die. This difference will usually become apparent during maintenance of the carbide die.

Many die designers, inexperienced in the building of carbide dies often unknowingly adopt poor carbide die design principles only to find that their dies will be difficult to maintain; that reassembly to original alignments is almost impossible. And, too late, they find that their construction methods will be much more expensive than anticipated.

As a carbide die builder of long experience, Harig has learned much about carbide die construction and is using these construction methods to best advantage. They have found that a carbide die that can not be reassembled to obtain original alignment can be judged as a failure.

From an operational standpoint, a carbide die that is

Carbide Die Success Depends on Little Details



The most satisfactory carbide die performance is obtained with the 4-post, high-precision die set. To facilitate resharping, the 2 pins up and 2 pins down design should be used. In the sketch above, ample clearance is evident.

slightly misaligned will wear excessively and will probably chip, requiring more frequent stoppages for repairs and for more frequent resharping. Should the dies be misaligned, carbide die costs will be unnecessarily high.

This article discusses several design factors which you should consider, whether or not your dies are built by a carbide die specialist.

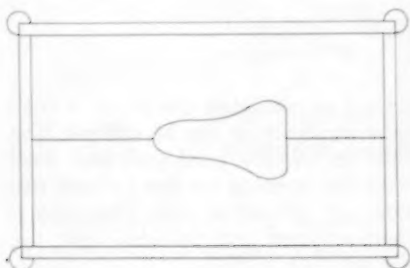
Selecting the Die Set

Experience has shown that the most satisfactory operation for the carbide die is obtained with the four post high precision die set. This type of die

set has all surfaces precision finished, with horizontal surfaces parallel within close tolerances.

Vertical alignment of carbide dies is imperative—the die set members must not be tilted or forced out of alignment by worn presses.

The guide post bushings must be a precision fit with provision for good lubrication. At Harig, we recommend the use of hard bronze guide post bushings with lubrication fittings and oil grooves. On certain types of carbide dies, however, ball bearing posts and bushings are specified. When using ball bearing posts and bushings



Carbide sections mounted in a die set should be protected from possible shifting due to the softness of the die set by means of shims or spacers. Alignments can be changed as needed when spacers are used.

the guide posts must be mounted on the upper die shoe to permit the bushings to operate properly, and the die set must not be tilted or inclined.

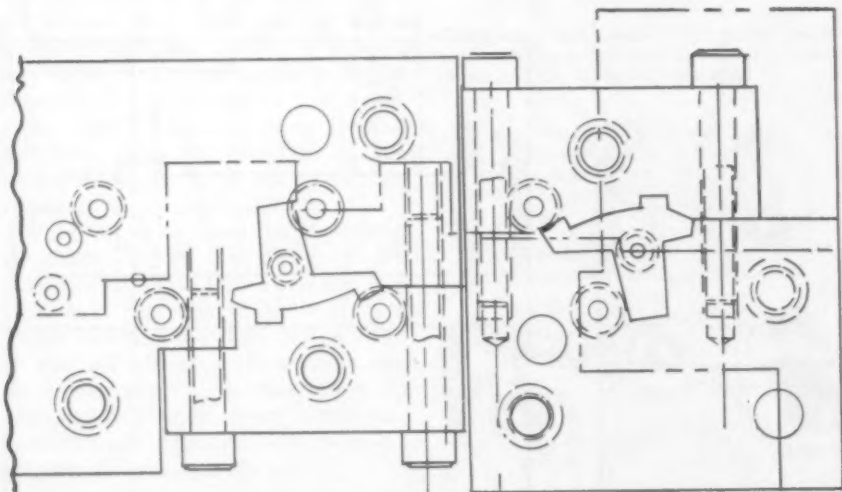
Mounting Carbide in the Die Set

One of the first considerations of good carbide die design is the type and location of the leader pins and

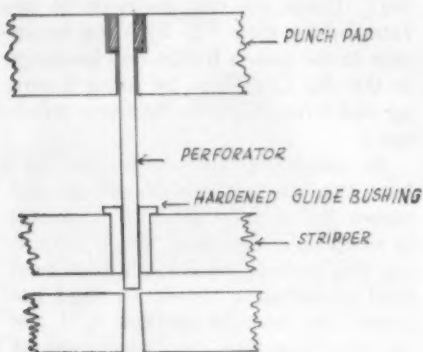
bushings. These should be so arranged that the die can be sharpened without removing any of the cutting members. There are two methods of accomplishing this: (1) by using leader pins in the punch holder and bushings in the die shoe, (2) by using 2 pins up and 2 pins down to facilitate grinding.

In mounting the carbide sections into the die set, sectioned ground pieces are usually set into a pocket or slot in the die shoe. When mounting the carbide sections, a hardened steel spacer shim should be used between the carbide sections and the die set. There are two good reasons for using these spacer shims. The spacers permit permanent adjustment of carbide sections and maintain that position of the carbide sections, preventing them from settling or working into the softer die set material.

When it is not practical to use



A more complex clamping method than the others. Note how the designer has built-in punch alignment, yet maintained simple assembly.



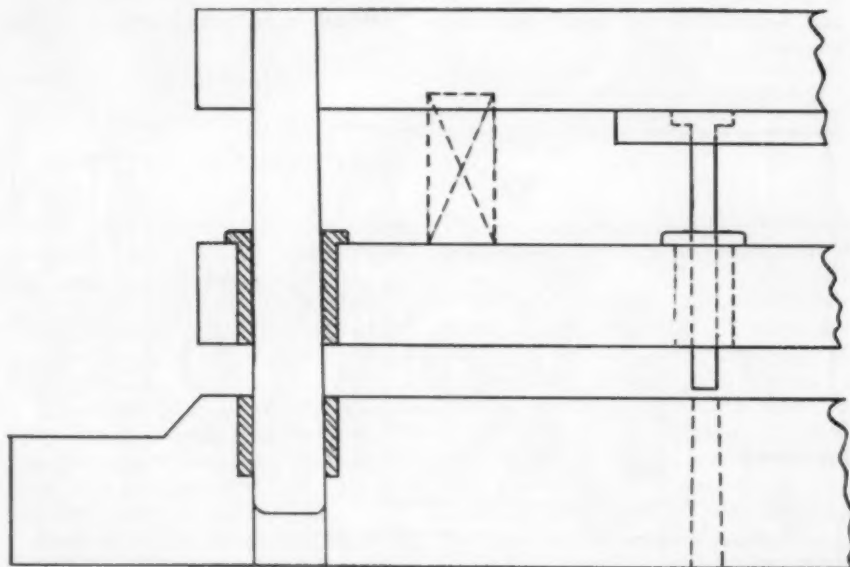
Shoulderless-type perforators are widely used by Harig and are floated in the punch pads. Alignments and rigidity are derived from the guide bushings located in the stripper.

slotted or pocketed die shoes, a yoke type construction can be utilized. The yoke is usually hardened tool steel with the opening for the carbide sections jig ground to size. The yoke is then screwed and doweled onto the die set.

Guiding of Perforators

To prevent shearing and chipping, all small perforators and narrow punches should be guided by hardened and solid strippers.

A spring stripper should be a guiding, guided stripper, guided on pins and bushings (usually 2 to 4 sets). In lamination dies, the die set pins



A spring stripper should be a guiding guided member. Bushings are mounted in the stripper to guide perforators and fragile punches; the stripper is guided by the pins and bushings.

You must be able to reassemble a die to original alignments

Use spacers between carbide and steel to maintain position under operating stresses

sometimes double for this purpose.

A solid stripper should be designed the same way as those used in steel dies. Whether a solid or spring stripper is used, all perforators and fragile punches should be guided with bushings or have hardened inserts built into the strippers.

Perforator and Punch Design

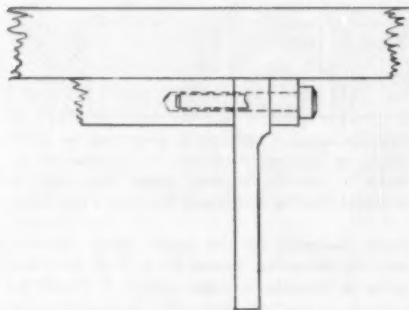
Carbide perforators are designed in much the same manner as steel perforators. However, in lamination dies, the perforators can often be straight-through or of the shoulderless type because of the relatively thin material to be cut. Where possible, centerless ground carbide cylinders with brazed-on sleeves for heads are used for diameters between $\frac{1}{8}$ " and $\frac{1}{4}$ ". More and more, we are using the policy of floating the perforators in the punch pads with precision guiding by the stripper. Thus, the function of the punch holder is to hit, not to hold or guide the small perforators.

Punches, which are large cutting members, should be designed for maximum strength with minimum material cost. An essential factor of good punch construction is to design them so that all cutting edge surfaces can be ground readily. In many cases jig grinding will be necessary where surfaces cannot be ground on surface and contour grinding machines.

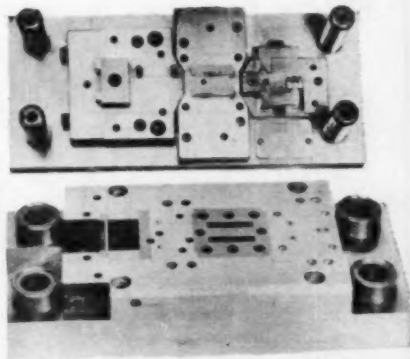
Mounting the Punches

Quite often punches are clamped

to a punch shoulder pad—or the punches can be designed with heels to obtain rigidity. It has been noted quite frequently that heels are tapped for mounting screws. Better practice,



Clamp the punch to the punch holder pad—or design heels into the punch. This sketch shows another clamping variation.



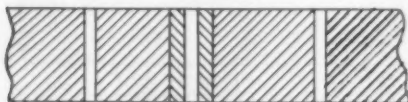
One method of clamping perforators is shown in this photograph of an E & I lamination die. Clamps are located left of center at the top.

*Good carbide die design improves performance,
simplifies maintenance*

and to avoid the expense of tapped holes which cost between \$10.00 and \$20.00, is to mount the heel with the shoulder of the screw in the heel of the carbide punch.

Small Holes Should be Bushed

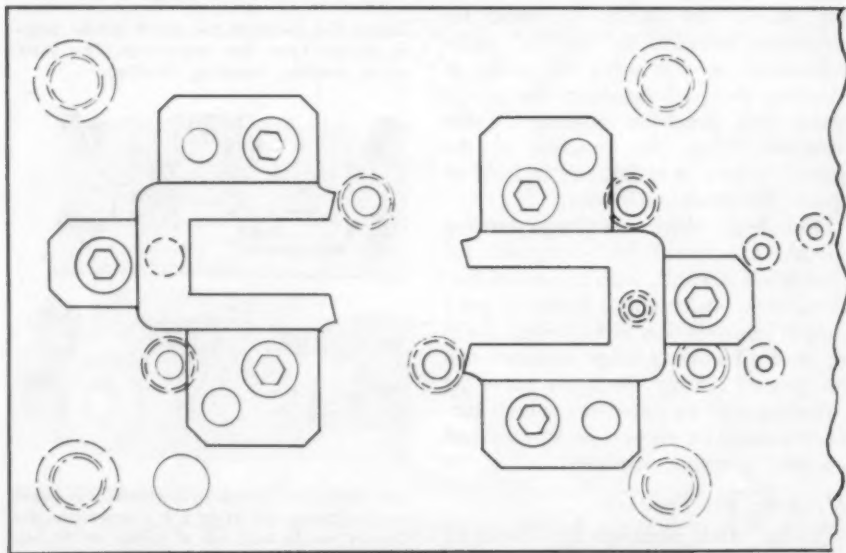
Carbide bushings pressed into car-



Carbide against carbide is preferred on small holes, as illustrated above. It is easier to replace a carbide bushing when the edge is chipped than to resharpen the entire die face.

bide sections on small holes up to $\frac{1}{2}$ " diameter are preferred because it is easier to replace the carbide bushing when it has been chipped than to regrind the entire die surface when small holes are used in the carbide sections. Too often die designers overlook this construction with the result that die life is considerably shortened due to heavy stock removal necessary to resharpen the cutting edge of a small hole. Punches of larger diameters, over $\frac{1}{2}$ ", have enough rigidity to reduce this danger of misalignment, which causes chipping.

Heels designed on the punch offer rigidity, easy assembly and disassembly. Note however, that the mounting screws have their shoulders in the heel and not in the punch pad. Tapping holes in carbide is expensive and should be avoided where possible.



Use 4-post die sets for carbide dies

Contour Grinding

In Harig Manufacturing, when irregular shapes are required for carbide sections, it is essential that we design the carbide sections with contour grinding equipment in mind. This equipment consists of (1) a precision layout machine to scribe lines at 20 to 50 magnification on a distortion-proof material, such as glass, and (2) a contour grinding machine which can grind contours of almost any irregular shape within .0002" accuracy.

Over-all Design Problems

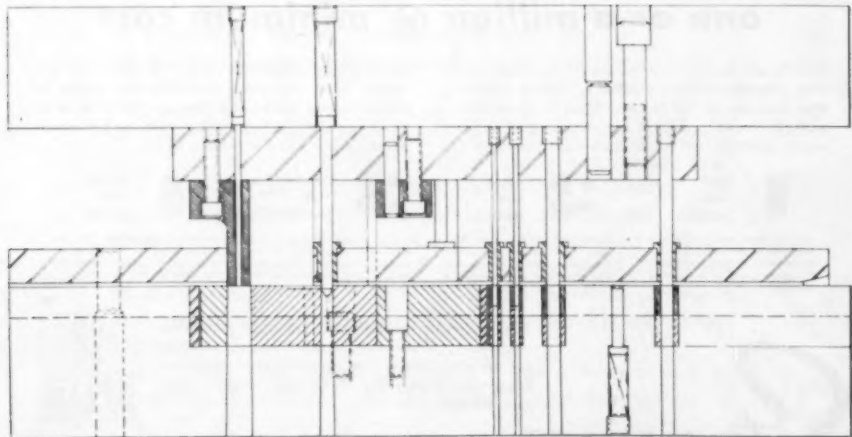
What makes a good or successful

carbide die design? Success or failure depends greatly upon the minor details and careful construction. Knowing what to do and how to do it depends upon the know how and experience of the die builder plus the equipment to do the job right. That is why you should work with firms who specialize in building quality dies, to add their experience to your shop.

The suggestions outlined in this article indicate some of the results of Harig carbide die building experience. When you examine the design of your next die, check these points carefully.

• • •

An over-all side view of a carbide die showing heel construction of punch; floating perforators; guiding stripper with bushings; shim spacers to protect carbide from shifting in softer die set material. Much of the precision of this carbide die lies in the narrow space between the die and the solid stripper with its guide bushings.





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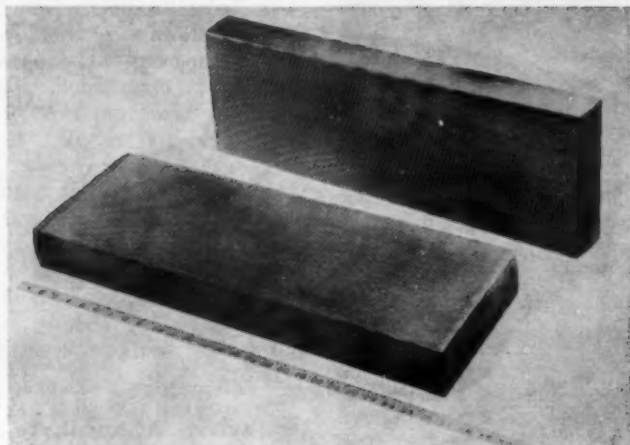


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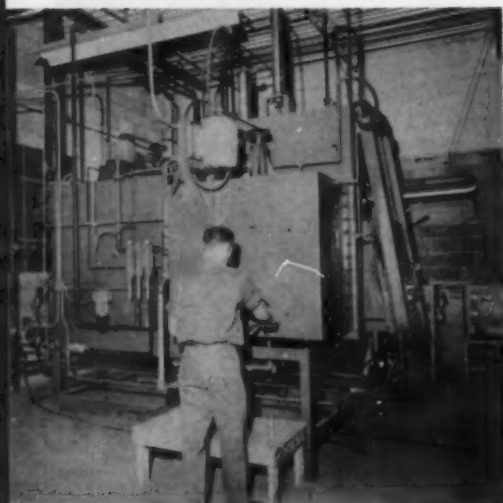
1. Large dies must be held to very tight dimensional tolerances.

IMPROVED FURNACE ATMOSPHERE ADDS LIFE TO THREAD ROLLING DIES

By **Herbert L. Yankee**, Vice Pres. & Gen. Mgr.
Sterling Die Division, Pratt and Whitney Co., Inc.

■ Most of the precision dies manufactured by the Sterling Die Division of Pratt and Whitney Company, Inc. are sold to the fastener manufacturing industry. The highly competitive fastener field requires thread rolling dies to hold exact dimensions while processing literally millions of threaded parts. Extreme care must be taken in the making of the dies to insure dimensional precision and metallurgical quality sufficient to provide maximum life to the die.

Sterling's dies range in length from a few inches to several feet and vary in thickness and width up to 12



2. Operator transfers the hot load into the cooling chamber from the vestibule. Atmosphere gas is used to protect the work while it is cooling.

inches. The dies previously were heat treated manually and heat treating tongs often marred the threaded sections, causing damage to the dies. Also, wire brushing was necessary to remove scale.

A standard Allcase atmosphere heat treating furnace was selected by Sterling Die Division to increase die life. The furnace, built by Surface, is used to heat treat high carbon-high chrome thread rolling dies. Besides an appreciable stepping up of die life, this modern equipment has reduced manual labor, increased production and improved working conditions.

The company purchases its high chrome-high carbon steel in bar form and it is stored to await processing. The first step in the production of

dies is to cut the bar stock into proper lengths. These bars are machined down (from 1/16" to 1/8", depending on size) to remove decarburized skin. The rough die is then carefully milled and ground to accurate form and dimensions.

In order to hold dimensions and obtain optimum physical properties, uniform heating and controlled cooling must be maintained. Uncontrolled distortion is encountered when dies are cooled too rapidly. Conversely, grain growth can weaken the die structure if the rate of cooling is too slow. An improved method of close control was effected by the use of a standard Allcase furnace, modified with a water-jacketed cooling chamber. The cooling chamber is located at the right side of the vestibule (see Fig. 2).

Protective Atmosphere

Atmosphere to eliminate and prevent changes in surface chemistry is supplied to the furnace by a Surface 500 cfh RX generator. A fan in the furnace roof distributes the atmosphere around educator type 35/15 alloy radiant tubes and through the load, to effect fast uniform heating.

Small dies are separated from those with heavier sections at the time baskets are loaded prior to charging. The baskets which are made of sheet metal are 24" x 30" x 16" high. They are placed on two cast alloy grid trays each of which can take a maximum load of 250 pounds. Two loaded trays are placed on a rolled charge table or dolly and are rolled to the vestibule door. The door is then opened and the charge is pushed into the vestibule.

After the vestibule is purged a

door leading to the heating chamber is opened and the work is moved into the chamber. Here, parts attain full temperature (1950°F) and soak for 2½ to 3 hours, depending on the size of the load. During this time atmosphere dew point is checked and held to a range of 32° to 35°F.

Uniform Cooling

At the completion of the heating cycle the operator opens the heating chamber door, pulls the load back into the vestibule and by means of a transfer conveyor, moves the load into a water jacketed cooling chamber. Atmosphere gas is also supplied to the cooling chamber to protect the charge. It is circulated by a fan to promote uniform cooling.

While one load is cooling, another is charged into the furnace. This sequence of operation permits the furnace to be continually operated at full capacity. Control equipment includes a Leeds and Northrup recording controller with cam control

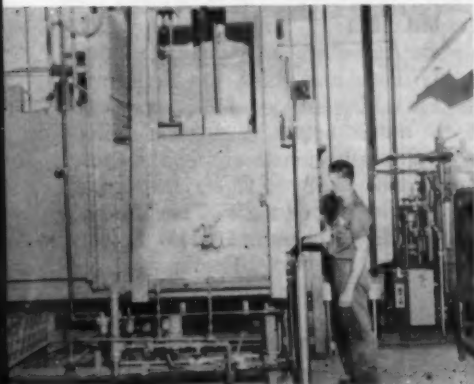
for program operation.

After the load is removed from the furnace, the dies are given a single tempering operation in an air recirculating draw furnace. Hardness is consistently held within a range of 59 to 61 Rockwell C. Sterling Die has found the heat treating cycle consistent enough to eliminate deep-freezing. On completion of the heat treating cycle all dies are given a light liquid honing for appearance and then readied for shipment.

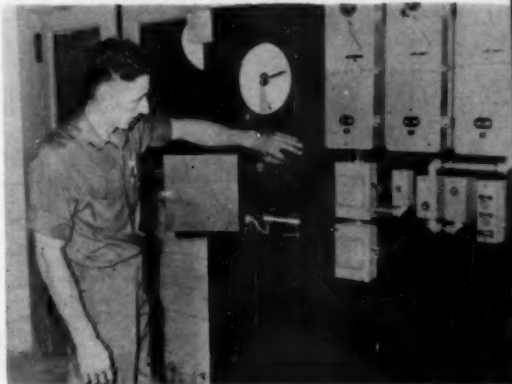
Summary

Dies are now more uniform and accurate in size, and exhibit better wearing properties. Manual labor has been reduced, in-plant rejects have been lowered and scrap loss has been minimized. Heat treating cycles have been cut from 9 hours to 4½ hours. This Allcase furnace installation has considerably improved die quality and also done much to promote cleaner and better working conditions.

• • •

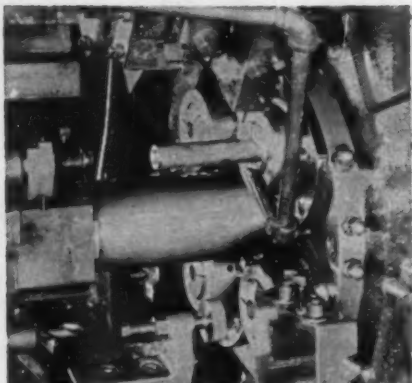


3. Operator opens and closes Allcase furnace doors by manipulating air valves. Small Surface RX Generator (right) supplies atmosphere. Cooling chamber is located to the left of the vestibule.

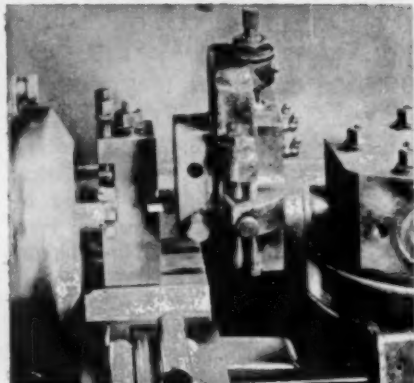


4. Simple panel board includes cam control for automatic cycling for heating.

Mill Burnished Tubing Cuts Cost of Mercury Relay Housing



Preparation of the housing is reduced to simply cut-off and chamfer-counterboring operations. No broaching of the I.D. is required as the bur-



nished finish on the Carpenter tubing is entirely satisfactory.

The Adams & Westlake Co., Elkhart, Ind., used mill-burnished tubing and eliminated an expensive broaching operation and reduced the cost



No radial marks can be tolerated on the I.D. of the tubing. The final drawing operation performed by Carpenter on the tubing assures a smooth polished internal surface. The semi-hard condition makes the tubing easy to machine.

of the part by 30%. The mill-burnished Type 304 tubing affording these advantages is manufactured by The Carpenter Steel Co., Alloy Tube Division, Union, N.J. A final cold drawing

operation after annealing and pickling produces a smoother finish with tighter tolerances. The final cold draw, or burnishing, work hardens the tubing to a semi-hard condition which results in better wear characteristics.

Hardness and finish are important as the tubing is used for housings in both quick acting and time delay relays. In addition to acting as a container, the tubing I.D. is the guide for the floating plunger. The plunger completes millions of cycles in the life of the mercury displacement relays. Even the minutest surface imperfection can interfere with the smooth operation of the relay.

Previously, a costly and troublesome broaching operation was used to produce the desired internal finish.

The Adams & Westlake Co. undertook an extensive life testing program

to insure the high reliability that users expect of Adlake mercury relays. At 200 cpm, tests were run that subjected sample relays to a minimum of 30-million cycles. After test units ran 33- to 35-million cycles without failure, the production changeover was made to Carpenter tubing.

Machining and handling of the housing is simplified to merely cut-off, chamfer and counterboring both

ends. Ends of the tubing are welded during assembly without a subsequent annealing operation. The cut-off parts are inspected 100%. After chamfering and counterboring an additional 50% are inspected. An additional 100% inspection is applied to the parts before assembly. Even with this extreme amount of care and inspection, it is still possible to cut the cost of the part by 30%. • • •



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0	70-72-76-80-90-100
1	48-56-60-64-72-80-96-90-100
2	48-52-54-56-64-72-80
3	40-44-46-48-56-60-64
4	32-36-40-42-44-48-56-60-64-72-80
5	30-32-36-40-44-48-56-60-64-80-100
6	28-30-32-36-40-44-48-56-60-64-72-80
7	30-32-36-40-48-64
8	24-28-30-36-38-40-44-48-56-60-64-80
9	24-28-32-36-40
10	26-28-30-36-40-48-56-60-64
12	20-22-24-28-30-32-36-40-48-56-60
14	20-24-28-32-36-40-48
1/16	60-64-72
1/8	32-36-40-44-48-56-64
3/16	72
1/4	32-36-40-44-48-38
5/16	20-24-27-28-32-36-40-48-56
3/8	20-24-28-32-36-40
1/2	36-48
5/8	14-16-18-22-24-26-27-28-30-32-36-40-48-56-64-80
3/4	18-20-24-27-28-32-40-64
7/8	16-18-20-22-24-26-27-28-30-32-36-40-48-64

SIZE THREADS PER INCH

1 1/16	20-28-32-40-48
1/8	12-13-14-18-20-22-27-28-30-32-36-40-48
1 1/8	16-20-24-32
1 1/4	12-14-16-18-20-24-27-28-32-36-40-48
1 1/2	32
1 3/4	12-13-14-16-18-20-24-27-28-32-36-40
2	12-14-16-18-20-24-27-28-32-36-40
2 1/4	10-11-12-14-16-18-20-24-27-28-32-36-40
2 1/2	10-11-12-14-16-18-20-24-27-28-32-40
2 3/4	10-11-12-14-16-18-20-24-27-28-30-36-40
3	10-11-12-14-16-18-20-24-27-28-32-40
3 1/4	10-12-14-16-18-20-24-27-32
3 1/2	9-10-12-14-16-18-20-24-27-28-32-40
3 3/4	8-9-10-12-14-16-18-20-24-27-32-40
4	8-10-12-14-16-18-20-24-27-32-36-40
4 1/4	10-12-14-16-18-20-24-27-32
4 1/2	7-8-10-12-14-16-18-20-24-27-32-36
4 3/4	8-10-12-14-16-18-20-24-27-32
5	7-8-10-12-14-16-18-20-24-27-32

SIZE THREADS PER INCH

1 1/16	6-8-10-12-14-16-18-20-24-27-32
1/8	6-8-10-12-14-16-18-20-24-27-32
1 1/8	8-10-12-14-16-18-20-24
1 1/4	6-8-10-12-14-16-18-20-24
1 1/2	12-14-16-18-20-24
1 3/4	5 1/2-6-8-10-12-14-16-18-20-24
2	6-8-10-12-14-16-18-20-24
2 1/4	5-8-10-12-14-16-18-20-24
2 1/2	8-10-12-14-16-18-20-24-32
2 3/4	5-8-10-12-14-16-18-20-24
3	5-6-8-10-12-14-16-18-20-24
3 1/4	4-6-8-10-12-14-16-18-20-24
3 1/2	12-14-16
3 3/4	8-10-12-14-16-18-20
4	10-12-14-16
4 1/4	10-12-14-16
4 1/2	4 1/2-8-10-12-14-16-18
4 3/4	12-14-16-18
5	8-10-12-14-16-18
5 1/4	4-6-8-10-12-14-16-18
5 1/2	8-10-12-14-16-18
5 3/4	4-8-10-12-14-16-18
6	8-10-12-14-16
6 1/4	8-10-12-14-16

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**HIGH SPEED STEEL
PLUG OR SPIRAL POINT
Size & Thds. Size & Thds.**

6-32	1/4-28
8-32	1/2-24
10-24	3/4-24
10-32	7/8-20
	1-20

OVER & UNDERSIZE

+ .005 — .005

Size & Thds. Over & Undersize

1/4-20	+ .005, + .010, — .0015
1/8-18	+ .005, + .010, — .0015
1/4-16	+ .005, + .010, — .0015
1/2-13	+ .005, + .010, — .0015

UNIPASS ACME TAPS

HIGH SPEED STEEL

Size & Thds. Size & Thds.

1/4-10	1 1/4-5
1/8-8	1 1/2-5
1/4-6	1 3/4-4
1/2-6	1 1/2-4
1-5	

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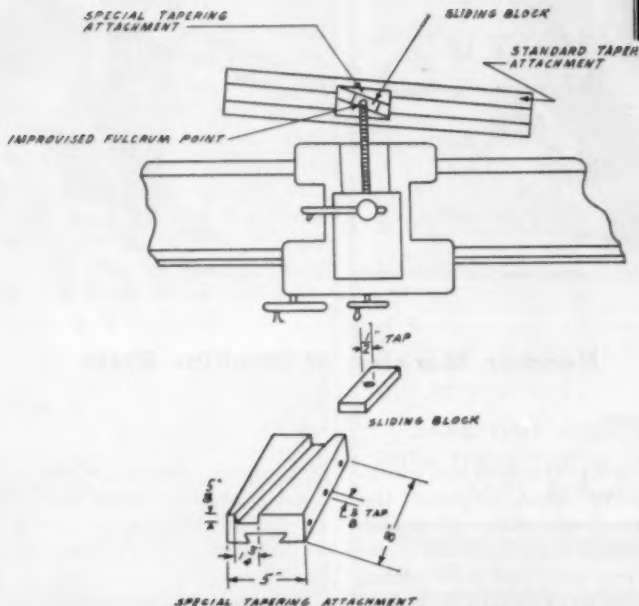
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shop hints and kinks

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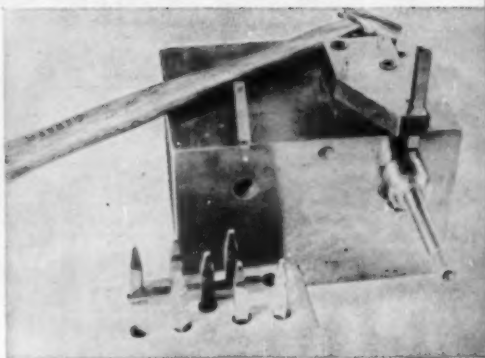


SPECIAL TAPERING ATTACHMENT

By John M. Breen

■ Steep tapers can be made with this special tailor-made attachment. With a little ingenuity, this system can be adapted to almost any lathe. We turn a special die which requires tapers up to approximately 40°. Also required is a groove in the top which has a close fit sliding block. The groove in the top has a close fit sliding block. A hole in the center attaches by stud to the cross feed screw. The adjustment is to any taper within its range. We use several blocks to cover our complete range. The standard taper attachment has a limited range of taper. To go beyond this we made the special set-up. • • •

Many sizes and many variations of this type of turning is required. The special taper set-up has been very successful. It consists of the large block that is fastened to the taper attachment dovetail with a mating dovetail and set screws. This is locked into place in the desired position. The groove in the top has a close fit sliding block. A hole in the center attaches by stud to the cross feed screw. The adjustment is to any taper within its range. We use several blocks to cover our complete range. The standard taper attachment has a limited range of taper. To go beyond this we made the special set-up. • • •



Number Marking of Machine Dials

By H. J. Gerber

■ Building of experimental and prototype machinery often requires the making of small quantities of graduated dials. These dials must be number marked in a neat and professional manner but the work cannot be tooled up with special marking machinery or custom made dies due to the cost.

To do this job in a neat and orderly manner we have devised a number of set-ups similar to the ones illustrated. A set of good quality hand numbering stamps were surface ground to uniform thickness to fit into a slot in the tool steel guide plate which is shown clamped to the top of a cast iron set-up cube. The workpiece is, in one case, shown held in a small toolmaker's vise below the stamp holder. This vise is also clamped to the cube for the duration of the job. The work is rotated in the central "V" slot in the vise jaw to bring it into each marked position. The numeral is indented by

striking the stamp a sharp blow with a small hammer. With reasonable care in aligning the stamp to each position a thoroughly professional result can be attained.

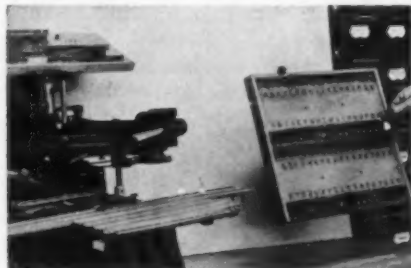
We use another modification of this method for marking the numerals on the peripheral surface of small dials. The other illustration shows a dial held on a standard lathe mandrel which in turn is inserted into a reamed hole in the side of the set-up cube. As the mandrel is rotated to each position the stamps are aligned adjacent to desired graduation and indented. This arrangement assures numerals which are straight and an equal distance from the edge of the dial.

While not recommended for quantity production these ideas are still often useful for the occasional few dials needed for models and for special tooling items which are made in almost every machine shop. • • •

Handy Type Holder For Engraving Machine

By Don Crawford

■ For the owner or user of a small nameplate engraving machine using $\frac{1}{2}$ " or $\frac{3}{4}$ " type blanks, the fixture described will speed production greatly. Instead of having to pick the type out of the compartmented tray, facing it, getting it right side up, etc. you simply grasp the blank at the bottom of the slot. It is right side up, faced and ready to put into the type slide. One, two and even three blanks may be stacked in the



fingers at one time, ready for insertion into the slide.

Gravity keeps the type ready to take out of the rack at all times.

Loss of skin on the thumb and forefinger was the prime mover in the construction of this device.

The fixture is easily made with a piece of "1" lumber and scraps of thin plywood. Saw slots are cut vertically just deep enough for the easy movement of the type. A horizontal divider is put in the middle to make two sections. The top section A to R, the lower S to zero. The thin plywood can be used to trim top, sides, bottom and the two panels that hold the type in the slots.

• • •

STANDARD BROACHES CUT COSTS

Minute Man

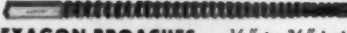
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In one minute and for as little as one cent you can cut a keyway with the Minute Man Keyway Broach Kit. For keyways from $\frac{1}{16}$ " to 1" in any bore from $\frac{1}{4}$ " to 3".

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WITH THESE OTHER STANDARD
STOCK BROACHES**


SQUARE BROACHES — $\frac{1}{8}$ " to $\frac{3}{4}$ " holes


HEXAGON BROACHES — $\frac{1}{8}$ " to $\frac{3}{4}$ " holes


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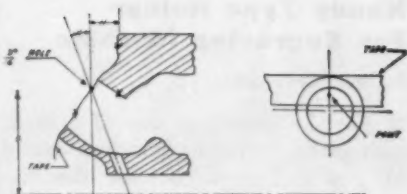
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Tape Helps Locate Hole

By **Erum Antlitz**

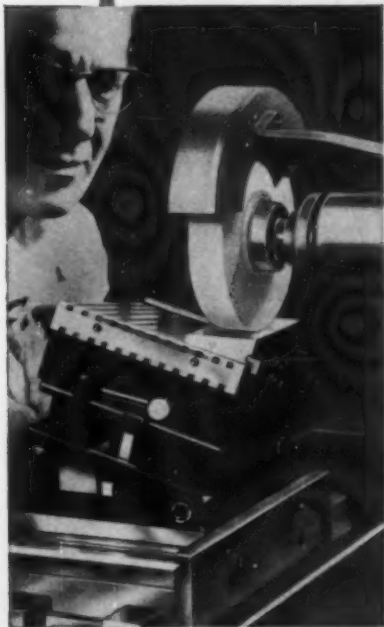
■ Many times we come across a hole location in a housing having the dimensions given "in the air" on an angle. When this hole passes through a machined bore and face we use a simple and fast method of picking up this point: stretching a piece of scotch tape across the finished face. The point of location is made by spotting the tape while the section is at right angles; then adjusting to the required angle and picking up the spotted point on the tape with a wiggler. This method is used only if tolerances permit. . . .



"Oh, come on, Newton, one more won't break the camel's back!"

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free literature

12

To receive copies of booklets described below, circle their identifying numbers on an Action Card, found opposite pages 80 and 208.



(See Number 1)



(See Number 2)



(See Number 3)

1. Tapping Guide. The "Tap Selector" allows the user to quickly select the correct tap for most tapping jobs. It indicates the proper size to use for a desired class of fit, the tap drill size, theoretical percentage of full thread, tapping speeds, lubricants for various materials, the correct style tap to use for through or bottoming holes and other helpful tapping hints. Jarvis Corp., N. Attleboro, Mass.

2. High Speed Metal Band Saws. Bulletin 6601 describes three models of Peerless high speed band saws—Model 2216 which has a four-speed belt pulley drive; Model 1216 with greater capacity and variable speed drive, and the fully automatic Model 1214 equipped with automatic feed conveyor. Illustrations point out the special features of the saws such as counterbalanced saw arm, variable speed drive with speeds 50 to 350 fpm, uniform feed pressure control, etc. Peerless Machine Co., Racine, Wis.

3. Optical Measuring Instruments. The Model 10 optical comparator, with 10" dia. screen size, is diagrammed in recent brochure, with optical data provided. Accessories available are illustrated, as well as surface illuminators, calibrating template and scale, and measuring charts. Model A-10 is illustrated and described also. Projecto-Graph Instruments Corp., Clinton, Conn.

4. "Useful Information for the Screw Machine and Estimating Departments" is the title of the publication, "Die Headlines," volume five, number two. Some of the useful tables provided include the weights per foot of round, square and hexagon bars in steel, brass and aluminum screw stock in sizes from 1/16" to 3"; the equivalent rpm's for different surface feet from 15 to 200, and a table giving the pitch in decimal inches and depth of thread from 4 to 80 threads per inch. Also included are handy "rules of thumb" on screw threads, tap drills and similar subjects. The Eastern Machine Screw Corp., New Haven.

5. Gear Chamfering and Deburring Machine. The Swedish Koping factory has released information on a semi-automatic gear chamfering and deburring machine, which is said to work clusters of one to five gears in a single operation. Capacity is 7" swing on 16" centers. Brochure is available through Homestrand Machine Tool Corp., Greenwich, Conn.

FREE LITERATURE continued

6. Disc Grinding Wheels. Four-page brochure describes the characteristics of disc wheels and provides performance records on various disc grinding operations. Wheel recommendations for cutting a wide range of materials are also included. Macklin Co., Jackson, Mich.

7. Swivel Toggle Shoe Clamps, for any mechanical jaw where push and pull pressure is required, use any screws. Specifications and prices are provided. Flyer available from Standard Parts Co., Bedford, Ohio.

8. Hydraulic Presses, in 25 to 600 ton models, are discussed in Bulletin 415. They are designed for drawing and forming metal parts requiring the utmost performance from accurate and complicated dies. Dake Corp., Grand Haven, Mich.

9. Electrical-Discharge Machine. The Cincinnati No. 1 Elektrojet, with universal workhead, adjustable slide, and open-front dielectric tank is illustrated in literature. Features, general specifications, and available accessories are included. Milling Machine Div., Cincinnati Milling Machine Co., Cincinnati, Ohio.

10. Diamond Coated Saws and Tools, for glass based, glass laminated, or glass reinforced plastics are supplied in catalog available. Typical applications are given, with illustrations showing uses for these tools. Products specified include Ordco heavy duty saw blades, mounted wheels, specially designed tooling, etc. O'Rourke Diamond Co., N. Hollywood,

11. Turret Drilling Applications. Bulletin T-102 is a compilation of case histories which details tooling employed and documents operations and time required. Applications include random hole patterns in one, two and many planes, concentric bolt circles (flat surfaces and at different angles), and straight line hole patterns with photographs of tooling and drawings of parts. Brown & Sharpe Mfg. Co., Turret Drilling Div., E. Norwalk, Conn.

12. Portable Grinding. Recommendations for portable offhand grinding of mild steel, die steel, and high speed steel are offered in brochure available from the Chicago Wheel & Mfg. Co., Chicago.

13. Multi-Spindle Drill Head, using eight spindles, has a drilling capacity of $\frac{1}{2}$ " and tapping capacity of $\frac{1}{8}$ " in mild steel. It converts a single spindle drill press into a multi-spindle machine. Flyer is available from Industrial Sales Div., Cleveland Pneumatic Industries, Inc.

14. Hydraulic Press Brakes. 16-page catalog gives specifications on 150 ton to 1800 ton capacity models, plus information on design details and photographs of typical models. Verson Allsteel Press Co., Chicago, Ill.

15. Automatic Spray Machine. A brochure describes a method of automatically spraying one, two, or three surfaces of generally oval or rectangular-shaped pieces of varying length, where fine definition and paint demarcation are imperative. Conforming Matrix Corp., Toledo, Ohio.



(See Number 9)



(See Number 10)



(See Number 11)

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horizontal optical jig borer

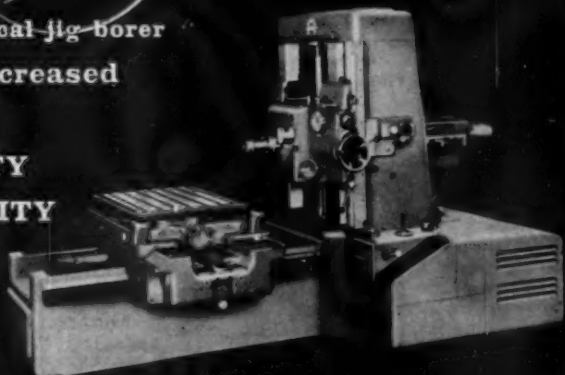
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- Increased capacity: table size $39\frac{1}{8}$ " x 32"; $29\frac{5}{8}$ " cross travel; $23\frac{3}{4}$ " longitudinal travel; $25\frac{1}{4}$ " vertical travel
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FREE LITERATURE continued

16. Hydraulic Shears. The new line of Steelweld hydraulic shears with pivoted-blade action is fully described in Catalog No. 2030-A. Provided are construction details and specifications on the shears, which are available in all sizes for cutting metal to 30' long and up to 2" thick. Steelweld Machinery Div., The Cleveland Crane & Engineering Co., Wickliffe, Ohio.

17. Rack and Pinion Roll Feeds for O.B.I. presses are described and illustrated in Bulletin A-11. Subjects covered are the operating and economical advantages of automated press operation, the basic principles of Littell roll feed design, roll feed application, functions of various types of roll lifters, of feed rolls and the micro-running adjustment feature. F. J. Littell Machine Co., Chicago.

18. Micrometers. Examples of standard micrometer calipers ranging from 1" through 60" are shown in brochure, along with illustrations of many "special" micrometers, including the snap gage, air foil, sheet metal and others. Pricing information is provided. J. T. Slocumb Co., S. Glastonbury, Conn.

19. Air Control Valves. This 20-page condensation of the general catalog of Ross air valves includes all standard models, with envelope dimensions, model numbers, pipe sizes, JIC symbols and other specifications. Ross Operating Valve Co., Detroit.

20. Heavy Duty Extension Bed Gap Lathe. Bulletin 211 gives complete features and specifications on this new Model HXB

26/45 lathe, which marks the entry of Nebel into a new lathe market. Advantages reported include 18 spindle speeds through complete gear range, up to 1500 rpm, 60 different feeds, and 60 thread changes. Nebel Lathe Div., Nebel Machine Tool Corp., Cincinnati.

21. Tools for Automatic Screw Machines and turret lathes, in three sizes, are covered in flyer as to specifications and prices. Products available are the Tru-Grip tool holder, drill and facer, knee tool, ball-bearing stock stop, adapter, and the adjustable tool holder. Dimension Products, Culver City, Calif.

22. Full Floating Tool Holders. The Toolflex line consists of three standard types consisting of 51 individual models—general purpose, tap holder and threaded adjustable. All standard types are stocked. Bulletin is available from Burgmaster Corp., Gardena, Calif.

23. Wheel Forming Attachment. The Model No. 5 Diaform, for permanent mounting, is reported to form-true complex grinding wheel contours accurate to "tenths" in minutes. Two sizes are offered—Model No. 5-1 for surface grinders of approx. 6" x 18" working surface will form-true grinding wheels up to 10" dia. x 1" face; Model No. 5-2 for surface grinders of approx. 8" x 24" working surface will form true grinding wheels up to 10" x 2". Pratt & Whitney Co., Inc., W. Hartford.

24. Hydraulic Press Brakes. Featured in Bulletin No. 91 is a selection chart, showing the essential differences between mechanical and hydraulic brakes in use,



(See Number 18)



(See Number 19)



(See Number 20)

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FREE LITERATURE continued

tonnage, stroke, speed, accuracy and ram adjustment. Complete specifications and die space dimensions are given for all 44 models in the 200-1000 ton line. Niagara Machine & Tool Works, Buffalo, N.Y.

25. Precision Balls. Catalog available includes the new AFBMA ball standards and it has cross referenced these new standards to the previous ones dated July 1956, for quick reference. It also contains a master table of ball grades and tolerances. The Quick Ball Selector Chart offers a comparison of various ball materials and their relative rating for specific applications. The Hartford Steel Ball Co., W. Hartford, Conn.

26. Industrial Coolant Pumps. Catalog No. 59 provides general descriptions and instructions on the Gusher pumps with motors from 1/10 to 7½ hp in two or three phase AC. Illustrations, diagrams, dimensions and capacities are given for the immersed type, long immersed type, outside pipe connected, etc. The Ruthman Machinery Co., Cincinnati, Ohio.

27. Snagging Wheels. Catalog PG-356 describes the features and proper selection of Cincinnati's snagging wheels for swing frame, floor stand, and portable grinding. It also includes a section on grinding operation costs, safety practices with snagging wheels, and a complete table of starting grades for rough grinding operations. Cincinnati Milling Products Div., Cincinnati Milling Machine Co.

28. Carbide Burs. Catalog CB-59 pictures and describes 14 different solid carbide burs, each available in three or four

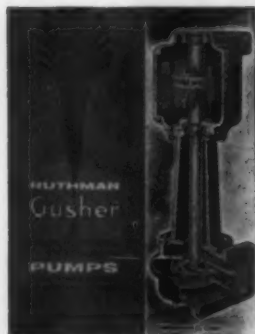
shank diameters, with coarse, standard, or fine fluting in plain, chip breaker, or diamond cut. These are used with power hand tools and flexible-shaft machines for cutting metals, plastics, and other materials. Thomas C. Wilson, Inc., Long Island City, N.Y.

29. Reflection Inspection Device. The J & L normal reflection unit, as described in folder, offers new inspection efficiency and capability to users of J & L FC-14 and TC-14 optical comparators. Jones & Lamson Machine Co., Springfield, Vt.

30. Aircraft Steels, AM-350 and AM-355, are discussed in 24-page booklet as to their mechanical and physical properties at various temperatures. Also included are sections on heat treating, fabrication, including forming, forging, welding, brazing, and machining. Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

31. Covers and Curtains, composed of new, neoprene-base materials, are available for numerous industrial and commercial uses. Other materials which are described in Bulletin GS-400 include Teflon and silicon with operational characteristics over a temperature range of 100° F to 500° F. A & A Mfg. Co., Inc., Milwaukee.

32. Diamond Dressing Tools. Literature points out that the cutting element of the Tru-Grit engineered wheel dressing tools is a concentration of selected, whole natural diamonds carefully graded for size and shape. The tools are made to user specifications for efficiency and economy in dressing form, straight face and thread grinding wheels. Wheel Trueing Tool Co., Detroit, Mich.



(See Number 26)



(See Number 27)



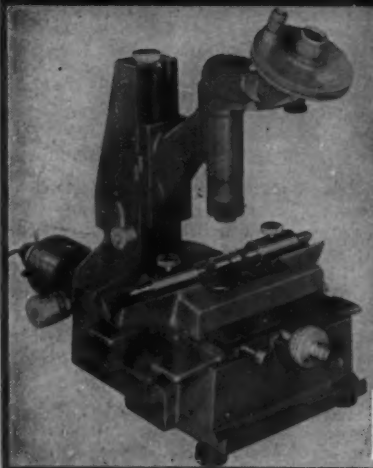
(See Number 28)

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FREE LITERATURE continued

33. Air-Hydraulic Boosters. Bulletin B-200P on Miller air-hydraulic boosters illustrates and describes how they convert shop air into intensified (up to 10,000 psi and over) hydraulic pressures for operating hydraulic cylinders and many other hydraulically operated devices. It contains pricing, mounting and dimensional data on popular models and sizes. Miller Fluid Power Div., Flick-Reedy Corp., Bensenville, Ill.

34. Gages. Colorfully designed catalog provides applications, operating instructions, specifications and prices on the various gages offered. These include recess gages, bore gages, depth gages, snap gages, bench comparators, etc. Reliant Gage & Supply Co., South Gate, Calif.

35. Collets, pushers, feed fingers and pads for all types of screw machines, as well as lathe collets, are listed in an easy-to-find manner in Catalog No. 59. This is available from the Benco Collet Manufacturing Co., Cleveland.

36. Air-Hydraulic Drill Unit. Model 17-400, designed as a building block component for assembly into automatic machines custom engineered to meet specific production requirements, is described as featuring quick, positive adjustment of all motions. Circular includes full specifications, dimensions, and other data. The Hartford Special Machinery Co.

37. Carbide Cutting Tools. Cole Carbide Industries has released their new combi-

nation catalog and file folder showing their efficient new plant, along with departmental divisions. Included are fine examples of many regular and special carbide cutting tools. Cole Carbide Industries, Royal Oak, Mich.

38. Bearing Aluminum Bars. A 12-page brochure, "The Technology of Bunting Bearing Aluminum Bars," pocket-size, is a combination of interesting data from foreword to the back cover, tabular matter and basic technical facts. The Bunting Brass and Bronze Co., Toledo.

39. Accessories for Hydraulic Machines. A number of accessories which vary the standard cycles of hydraulic drilling and tapping machines are described and illustrated in a recent bulletin. These products are available for both vertical and horizontal models of Baker machines, and include a time delay and reverse, a jump feed cam, hydraulic tapping unit, etc. Baker Bros., Inc., Toledo, Ohio.

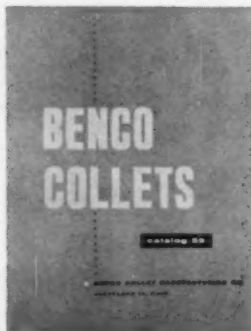
40. Furnaces. 12-page bulletin, No. SEC-4, describes Sunbeam's complete line of box-type fuel-fired furnaces. Sunbeam Equipment Corp., Meadville, Pa.

41. Pocket Guide to Steel Analyses. Listed are the compositions of 40 stainless steels, 184 alloy steels, and 105 carbon steels most often used in industry. Stainless and Strip Div., Jones & Laughlin Corp., Detroit.

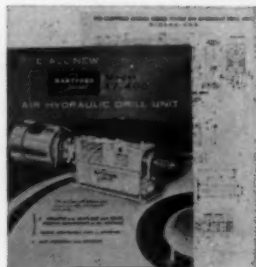
42. Adjustable-Speed Drives. Literature describes the Kinatrol speed variator which is an eddy-current coupling, packaged, adjustable-speed drive, with ratings and data. General Electric, Erie, Pa.



(See Number 34)



(See Number 35)



(See Number 36)

FREE LITERATURE continued

43. Manual for Exhaust Hood Designs. Bulletin 270-E2A, Volume 2, contains 46 installation photographs which illustrate the use of exhaust hoods in foundry shakeouts, melting furnaces, grinding and abrasive sawing, etc. American Air Filter Co., Inc., Louisville, Ky.

44. Industrial Valves. In addition to cross indexing the complete OIC line with the valves of 16 major manufacturers, the "Buyers Guide," form 1012, contains a list of frequently used abbreviations, a valve trim chart, a list of valves conforming to federal specifications, and complete figure number descriptions. The Ohio Injector Co., Wadsworth, Ohio.

45. Mechanical Conveyor Screens, in three models, are described in flyer as designed for the scalping and coarse and medium sizing of a wide range of bulk materials. The illustrated section contains complete descriptions, specifications and data. Syntron Co., Homer City, Pa.

46. Tube Fittings Finder. Condensed information in folder helps select proper fittings for various service and installa-

tion requirements. Shape charts for six types of industrial tube fittings are included. Parker Fittings & Hose Div., Parker-Hannifin Corp., Cleveland.

47. Ball Bearing Units. Catalog No. 60 describes Roberts' compact cast iron pillow block, four-bolt and two-bolt flange units, and take-up units and frames. Units are available with sealed precision ball bearing cartridges in shaft sizes $\frac{1}{2}$ " thru $2\frac{7}{16}$ ", or sealed commercial ball bearing cartridges in shaft sizes $\frac{1}{8}$ "- $1\frac{1}{2}$ ". Roberts Mfg., Inc., Salina, Kans.

48. Practical Tips on Ultrasonic Cleaning. Bulletin No. 16A describes the process by which high frequency sound waves impart intense scrubbing action to solutions to speed precision cleaning. Covered are compounds which have proved effective, and the types of operation ultrasonic cleaning does best. Oakite Products, Inc., New York City.

49. Nylon Stock Shapes. Available sizes for Cadco nylon rod, plate, sheet, strip and tubing are listed and typical applications are illustrated. Sizes range up to $10' \times 15'$ rod, $10' \times 12' \times 2"$ plate, $10' \times 12'$ O.D. tubes. Cadillac Plastic & Chemical Co., Detroit.

WALTON'S Special Offer gives you a set of TAP EXTRACTORS FREE



A short time ago we introduced our new "Style B" Tap Extensions. As part of a continuing program to make these tools well known to metalworking, we are offering a limited-time SPECIAL:— With each set of (9) Tap Extensions bought, we include FREE a set of (6) Tap Extractors. No quantity limit. Act before expiration.



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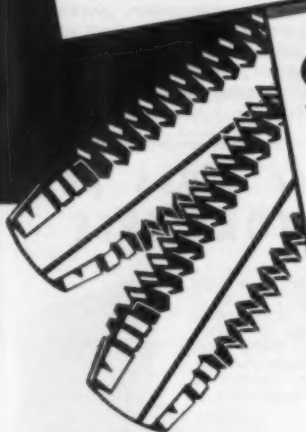
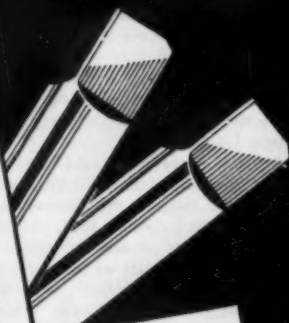


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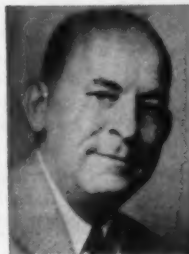
E. M. Hicks



F. J. Trecker



G. E. Marx



G. M. Stickell



J. F. Herkenhoff

NMTBA Officers Elected

Alan C. Mattison, president of Mattison Machine Works Rockford, Ill., was elected president of the National Machine Tool Builders' Association at its 58th Annual Meeting held at White Sulphur Springs, W.Va., Nov. 19.

Everett M. Hicks, vice president and general manager, Grinding Machine Division of the Norton Co., Worcester, Mass., was elected first vice president, and **Francis J. Trecker**, president, Kearney & Trecker Corp., Milwaukee, Wis., was elected second vice president. **Graham E. Marx**, vice president and general manager, The G. A. Gray Co., Cincinnati, Ohio, was re-elected treasurer. **Grayson M. Stickell**, president and general manager, Landis Machine Co., Waynesboro, Pa., was elected secretary.

New directors elected were **Mr. Trecker**, **John F. Herkenhoff**, president, the Minster Machine Co., Minster, Ohio, and

Hayward A. Gay, vice president, The Cincinnati Milling Machine Co.



H. A. Gay

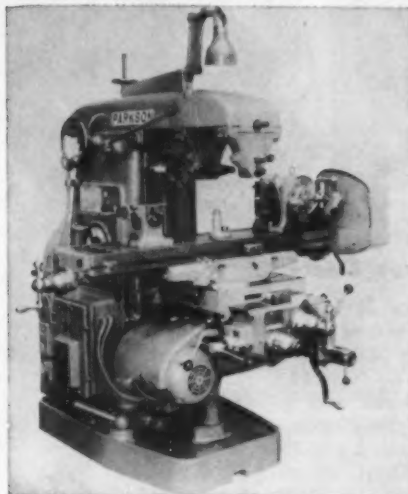


L. King

Ludlow King was re-elected executive vice president of the Association.

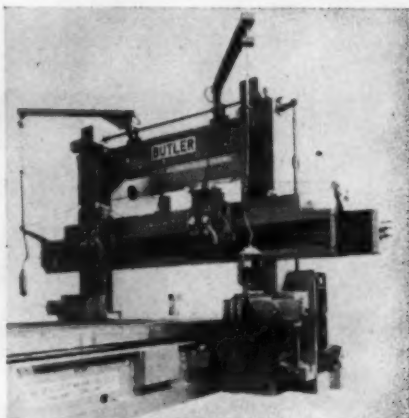
U.S. Machine Tool Builder To Market 5 British Lines In U.S.

Five of Britain's best known lines of machine tools will be sold and serviced in this country by a newly formed subsidiary of Lapointe Machine Tool Co. of Hudson, Mass., the Lapointe Ma-



Lapointe Parkinson No. 2 N U universal miller. Carefully selected by Lapointe executives, they include: Churchill Machine Tool Co., Ltd. (a full range of precision surface and internal grinders); John Lang & Sons,

Ltd. (large surfacing, boring, profiling and screw-cutting lathes); H. W. Ward & Co., Ltd. (large-capacity ram type and combination turret lathes); J. Par-



Lapointe Butler No. 9 planer, 35' x 10' x 8'.

kinson & Son, Ltd. (milling machines and gear planers, including the "Gear-bur" for deburring spur and helical gears), and Butler Machine Tool Co., Ltd. (planers, shapers and slotters).

These five companies have for many years marketed their products throughout the world through a jointly owned and operated sales subsidiary, Associated British Machine Tool Makers, Ltd. Until now, ABMTM has not been active in the U.S. market.

Machines of all five lines will be set up at Lapointe headquarters in Hudson, Mass., for production, demonstration, and instruction.

John J. Prindiville, Jr., president of Lapointe, will also serve as president of the new subsidiary. Other newly elected officers for the company include **Edward M. Dowd**, executive vice president, and **Joseph P. Crosby**, **Charles T. Parkin** and **Jacques A. Prindiville**, vice presidents. **Charles J. Hellen** is treasurer, and **James W. Dopp**, sales manager. Mr. Parkin is the resident liaison representative in England.

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- Reciprocating Hydraulic Slide Feeds

USE THEM FOR...

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Call in your nearby Hannifin man—he's a trained production analyst—to prove how you can do more at lower cost with Hannifin presses. Or, write for our new Bulletin 132. It tells the whole story.

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Because numerical control of machine tools is a new technological advance in manufacturing, present programming, operational and maintenance personnel lack the experience to step in and take over as they have done in the past with conventional machine tools.

To assist industry in the conversion from conventional to numerically controlled machine tools, the Industrial Controls Section, Bendix Aviation Corp. of Detroit, has provided during the past three years a numerical control training program. To date, 53 part programmers and 134 operations and maintenance personnel from over 25 different companies have been graduated from this training program. Also, in every Bendix numerically controlled installation throughout the country, plant maintenance personnel, trained at the Bendix school, have taken charge of full time maintenance at their respective plants. Reports indicate unscheduled electronic downtime is running on an average of less than 5%.

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Ex-Cell-O & Bryant Correlate Grinding Spindle Service

Faster service on grinding spindle repairs and lower transportation costs are the reasons for correlating spindle repair services of Ex-Cell-O Corp., Detroit and Bryant Chucking Grinder Co., an Ex-Cell-O subsidiary of Springfield, Vt., according to the announcement.

Under the new arrangement both Ex-Cell-O and Bryant grinding spindles will be serviced at the Ex-Cell-O plants in Detroit, Mich. and Downey, Calif. The Downey plant will repair all Ex-Cell-O spindles and all Bryant spindles except those with high frequency in-built motors. Service facilities for Ex-Cell-O spindles will continue to be maintained at the Ex-Cell-O plants in Lima, Ohio and London, Ont., Canada.


The entire transaction, including billing, will be carried out by the plant to which the spindle is shipped, and the customer's purchase order should be sent to the plant where the work will be done.

Method Inspects and Records Gage Block Accuracies

A new method for inspecting and recording gage block accuracies incorporates specially - designed electronic equipment. It is said to eliminate any human error in the calibration of gage blocks. It is also said to speed up Webber's Gage Block Inspection Service so that blocks sent in for inspection can be returned to owners in a very short time.

The new electronic equipment automatically records gage block sizes on a special Certificate form. It shows deviation from marked size of each block to the 6th decimal place, and "flags" any blocks which are worn enough to require replacement in accordance with Federal Specifications.

Write for information on Webber Inspection Service to Webber Gage Company, 12900 Triskett Rd., Cleveland 11, Ohio.



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Crane Packing Co. Builds Plant For Processing du Pont Teflon

Crane Packing Co. of Morton Grove, Ill., has just completed the first plant reported as devoted exclusively to the full scale processing of du Pont Teflon—a post-war plastic material

which has done much to further major advancements in rocket and missile, aviation, electronic and chemical industries. Included in this is the processing of basic Teflon shapes (sheet, rod, tubing and tape) and the manufacture of both standard and custom proprietary items.

The recent official opening of the plant was attended by du Pont executives who had traveled from offices in Wilmington, Delaware, to attend the occasion.



Outside view of Crane Packing Co.'s new plant devoted exclusively to the processing of du Pont Teflon.

The plant was built to specifications conducive to the best processing of this remarkable industrial plastic to insure full retention of all of its electrical, chemical, mechanical and other outstanding properties in the end products.

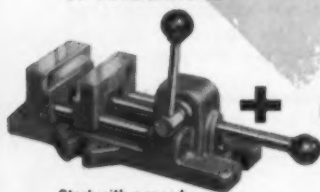
The new Teflon plant provides complete molding and machining facilities, using the latest types of hydraulic presses, ovens, extruders, lathes, skiving and slitting equipment. Total manufacturing area of the one story building is over 20,000 sq. ft. plus a unique



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speed production and cut tooling costs up to 75% and occasionally more. One glance at the example below will tell you why more and more cost conscious tool designers, nation-wide, start jigs and fixtures with a Heinrich Grip-Master. It's the easy way to solve your jig and fixture problems.



Start with a speedy
Grip-Master vise and fixture base.



Simply add false jaws
and bushing plate.

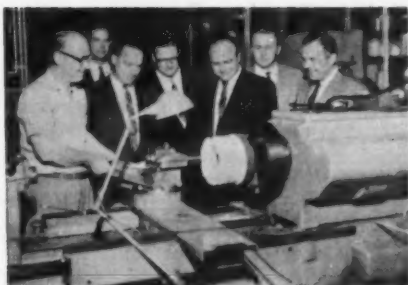


Result... an accurate,
precision-built, low-cost jig.

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Skilled Crane Packing Co. lathe operator demonstrates his technique to E. I. du Pont officials (left to right): I. du Pont, Jr. (director of Sales Service Laboratory), R. M. Campbell (Assistant Teflon Marketing Manager), C. D. Bell (Director of sales), and F. L. Brevoort, Jr. (District Sales Manager for the Chicago area office), as K. V. Rohlen, president of Crane Packing Co., looks on.

centrally mounted 400-sq. ft. cupola for handling vertical extrusions. It is located on Crane Packing Co.'s 22-acre Morton Grove tract.

U.S. Metalworking Plants Reduce Fire Losses

U. S. metalworking plants managed a reduction of about \$5 million in fire losses the past year, according to a report just released by the National Fire Protection Association. Total cost of fire damage and destruction to manufacturing facilities came to just under \$23 million in 1958, against a figure of about \$28 million for the previous year.

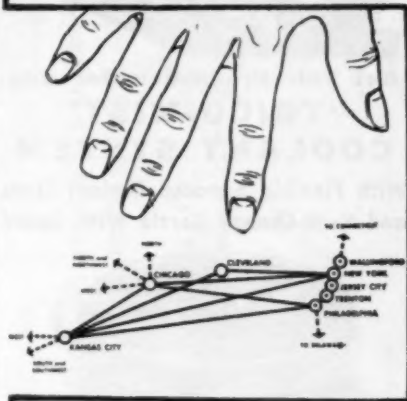
Jones & Lamson Machine Co. Acquires Benelux Facilities

The Jones & Lamson Machine Co. of Springfield, Vt., announced that it had acquired a substantial interest in the firm Le Progres Industriel, a builder of quality machine tools, located in Lot, near Brussels, Belgium.

The new company—to be known as Le Progres Industriel-Jones & Lamson Machine Co.—has the exclusive right to manufacture and sell in the European Common Market the current line of products made by Jones & Lamson in the United States.

Jones & Lamson will be represented on the Le Progres Board of Directors.

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 COOLANT SYSTEM**

**With Flexible Armored Coolant Lines
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For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers—single or multiple outlets—single or dual valve control.

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**Baird Machine Co.
 Completes Training Session**

The Baird Machine Co., Stratford, Conn., has announced that the "Baird Tech" program of training courses, aimed at orienting distributors to Baird products, manufacturing techniques and personnel, has recently completed a session. A training course was held for the Seifreut-Elstad Machinery Co. of Hackensack, N.J. Plant tours and inspection of machines and equipment highlighted the sessions.

"Baird Tech" has been in effect for two years and six to seven training courses are presented each year.

**Cleco Air Tools Develops
 Tools for Nuclear Program**

A \$100,000 sub-contract has been awarded Cleco Air Tools, a Division of Reed Roller Bit Co., to develop special tools for assembly and disassembly use in the Aircraft Nuclear Propulsion Program. Originally, sub-contracted with the General Electric Co., Aircraft Nuclear Propulsion Dept., for \$50,000, the contract has just recently been increased to \$100,000.



**Hard Carbide Chuck Jaws
 Solved Chucking Problem**

A chucking problem in machining electric motor frames for a large electrical manufacturer was solved by using these hard carbide chuck jaws. Greatly improved resistance to wear saved more than \$600 the first year. After 15 months' service the chuck jaws showed very little wear. The eight solid carbide jaws readily bite through scale and into hard steel or iron. They are one of many "Kengrips" which have been developed by Kennametal Inc., Latrobe, Pa.

Wallace Supplies Mfg. Co. Now Selling On Territory Basis

The Wallace Supplies Mfg. Co. of Chicago, after sixty years of selling its bending machines and abrasive cutting saws through dealers on an open account basis, has now gone into exclusive territory basis for its sales. United States and Canadian dealers, and their territories, are listed on page 178.

Mount Die Sinking Acquires LeCount Clamp & Lathe Dogs

The Mount Die Sinking and Forging Co., Unionville, Conn. announces the acquisition of the LeCount lines of Thor-Aloy electric steel "C" clamps and lathe dogs from LeCount Tool Works, Inc., West Hartford, Conn.



72" Vernier Height Gage Used by Lockheed Aircraft

Vernier height gages don't come much bigger than this 72" vernier height gage built by The L. S. Starrett Co., Athol, Mass., for the Lockheed Aircraft Corp., Missile and Space Div. of Sunnyvale, Calif. It is used by Lockheed, to check various components for missile work, as illustrated. Oversize vernier height gages are built on special order, including 60", and 72" size. Standard sizes cover 12", 18", 24", 36" and 48" ranges.

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Your Name
 Your Company
 Your Street
 Your City State

AT NO OBLIGATION TO ME.

Lyon Metal Products Announces New West Coast Plant



Lyon Metal Products, Inc. of Aurora, Ill., has purchased a manufacturing plant located 18 miles from downtown Los Angeles. The company stated that the action taken was to protect their western market by improving their competitive position through lower transportation costs, and to better service their western dealers and customers.

The Los Angeles district sales staff and warehouse operation will move immediately into the new Lyon offices, which are a separate part of the acquisi-

tion. The building in which Lyon has operated a warehouse and assembly operation in Los Angeles since 1922 has been sold to the Quaker Oats Co.

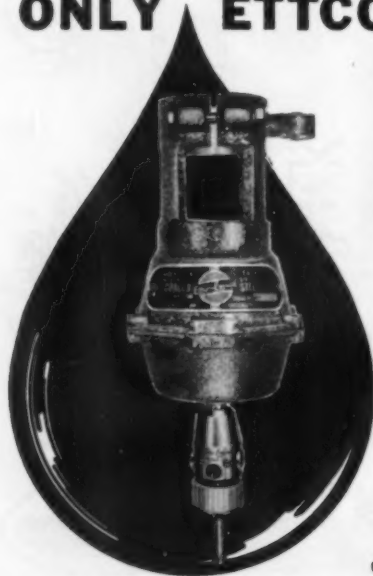
Whitney Metal Tool Co. Purchases Press Line

The Whitney Metal Tool Co. of Rockford, Ill., announces purchase of the throatless shear and cam press line as manufactured by Marshalltown Manufacturing Co. The Whitney Metal Tool Co. firm will continue the manufacturing of this line, offering sales and service from their Rockford, Ill. office.

New Plant Completed For J. D. Tool & Machine Co.

The J. D. Tool & Machine Co., Inc., is now in full operation at its new plant in Bethayres, Penn. The newly-built plant occupies a two-acre tract of land on Tomlinson Road at the junction of the Philadelphia and Montgomery county lines.

ONLY ETTCO TAPPERS



run in oil



- Faster, more accurate tapping
- Smoother running
- Longer lasting
- Much more sensitive
- Sealed in oil
- Fit any drill press

There's a low cost Ettco Tapping Attachment for every small hole job. Write for information.

— Buy them from your authorized Ettco distributor.

ETTCO TOOL & MACHINE CO., INC.

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AMTDA Announces Officers



J. R. Clark



G. E. Merryweather



I. B. Rabel



C. D. Day

J. Russell Clark, president of White Star Machinery & Supply Co. Inc., Wichita, Kans., has been elected president of the American Machine Tool Distributors' Association, it was announced at the Association's 35th Annual Meeting in St. Louis, Oct. 26, 1959. **George E. Merryweather**, president and treasurer of Merryweather-Strasman Machinery Corp., San Mateo, Calif. and

president of the Southwest Machine Tool Corp. of Phoenix, Ariz., has been announced as vice president of the Association.

Other elections include **I. B. Rabel**, president of Star Machinery Co., Seattle, Wash., having been elected second vice president, and **C. D. Day**, vice president of Machinery Associates, Inc., Wynnewood, Pa., secretary-treasurer.

Take the GLARE out of Caliper Reading



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KNIFE EDGES FOR
THREAD MEASUREMENTS
ADJUSTABLE SPRING GIB

Experts Agree . . .
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CROSS HORNS FOR INSIDE MEASUREMENTS

ACCURATE MACHINE DIVIDED SCALES

DULL CHROME FINISHED SCALE

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ELIMINATES GLARE

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Measurements in 1/1000"

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RAISED EDGES FOR GUIDING SLIDE

EXTRA LONG VERNIER

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Measuring Range — 5-5/16"

Graduations — 1/1000" & 1/128" or 1/1000" & 1/20mm

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MAHR GAGE CO., INC.

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HEADQUARTERS FOR PRECISION MEASURING INSTRUMENTS AND FINE TOOLS

National Tool and Die Manufacturers Assn. Elects New Officers



New officers of the National Tool & Die Manufacturers Association, elected during its 14th annual convention in New York and who will serve during 1959-60, are as follows: From left to right: Harold G. Murdock, first vice-president (vice president of Arrowsmith Tool & Die Corp., Los Angeles); E. W. Barnwell, treasurer (president of Apex Corp., Roseville, Mich.); John A. Barth, president (vice president and general manager, The Barth Corp., Cleveland); John D. Dewhurst, secretary (president, Arrow Tool Co., Wethersfield, Conn.), and James A. Perdy, second vice president (vice president of Atlantic Manufacturing Co., Philadelphia).

Dept. of Labor Honors National Tool & Die Assn. Pres.



For his outstanding contributions toward furthering the advancement of apprenticeship training in the metalworking industry, Jack Kleinoder (right), outgoing president of the NTDMA was awarded a certificate of meritorious service by the Department of Labor at the Association's 14th annual convention. Elliott French (at left) represented the Bureau of Apprenticeship and Training of the Department of Labor. Mr. Kleinoder is secretary-treasurer of Volkert Stampings, Inc., Queens Village, L.I.



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SPRING WINDER**

MAKE EXPERIMENTAL- REPLACEMENT SPRINGS

Fast. Accurately

Makes any number of coils or pitch desired, right or left hand springs. No lathe required, clamps in vise. Sizes No. 2, 3, & 4 use wire sizes .057, .128, & .229; priced at only \$37.50, \$47.50, & \$57.50. Hundreds in use. Ask for folder, or order TODAY!

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1524 MAIN ST., CUYAHOGA FALLS, OHIO, U.S.A.

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**H. Stanley Johnson,
Gisholt Executive Retires**

George H. Johnson, president of Gisholt Machine Co., Madison, Wisconsin, has announced the retirement of his brother, H. Stanley Johnson, executive vice president of the firm. Mr. H. S. Johnson is also a member of the board of directors and will continue to serve in that capacity. He recently completed 35 years of service with the company.

Obituary

J. Chester Bath

J. Chester Bath, 67, of Shrewsbury, Mass., vice president, treasurer and a director of John Bath & Co., Inc., of Worcester, Mass., died Oct. 19, after a short illness. He served for several years as sales manager in the company founded by his father in 1912 for the manufacture of taps and gages.



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MODEL 'J'**

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NOTHING!

**Johnson Model J
(Wet or Dry)
Cuts anything in
your stock pile.
10" rounds, 18"
flats, structurals
or odd shapes.
Centralized
controls, special
safety features,
variable speeds.**

True, you pay the low initial purchase price, but the big, rugged Johnson Model J is so well engineered, so dependable, so troublefree—so versatile, fast and accurate, that it quickly pays for itself in tangible savings. One Johnson metal cutting band saw... or a battery of them, will pay you big dividends in time, labor—smooth production and eliminate scrap.

Write Today... for your copy of the new Johnson catalog. All models and accessories described, illustrated in full.

Johnson MANUFACTURING CORPORATION
1012 Barnes St. Alben, Michigan

Appointments and Promotions

Personnel Changes . . . Executive and Production



J. P. Craven



O. R. Carpenter



R. B. Vogt



V. W. Sicking



K. Kuck



E. J. Ferris

J. P. Craven has been elected a vice president of The Babcock & Wilcox Co., New York, by the board of directors, and placed in charge of the Boiler Division's manufacturing department. **O. R. Carpenter** was elected assistant vice president for the same department . . . With the recent passing of **E. W. Buschman**, president of The E. W. Buschman Co., Cincinnati, directors of the company have elected **Rudy B. Vogt**, president, **Victor W. Sicking**, executive vice-president, and **Norman J. Tillar**, secretary and treasurer . . . **Kermit Kuck**, with the firm for 24 years, has been elevated to the position of executive vice president of The Monarch Machine Tool Co., Sidney, Ohio . . . **Milton R. Watko**, formerly with the International Conveyor & Washer Co., has been appointed as chief engineer for the Ransohoff Co., Hamilton, Ohio . . . **Edward J. Ferris, Jr.**, has been named factory manager and **Earl R. Lewis, Jr.**, production manager at Pratt & Whitney Co., Inc., W. Hartford, Conn. . . . **C. E. Huddleston**, recently appointed chief engineer for The Cleveland Punch & Shear Works Co., has been elected executive vice-president by the board of directors . . . **James J. Kelly**, formerly plant engineer at the company's main plant in Norristown, has been appointed assistant to the vice-president-manufacturing by Taylor Fibre Co., Norristown, Pa. Other appointments include that of **Joseph J. Shanda** named to the vacant plant engineer post, and **Lloyd J. Beesley** to the newly-created post



N. J. Tillar



M. R. Watko



E. R. Lewis

of assistant plant engineer . . . **A. J. Coulson**, superintendent of the United Engineering and Foundry Co., Vandergrift, Pa., has retired and the new superintendent is **Arthur R. Kommel** . . . **Edward C. Carman** has been named to the new position of director of business development planning for the Nashville Division, Avco Corp., Cincinnati, Ohio . . . **Birdsboro Steel Foundry and Machine Co.**, Birdsboro,

Pa. has elected **John P. Anderson** to the office of assistant secretary . . . Three major engineering appointments at the Utica, N.Y. division of Bendix Aviation Corp. have been announced. **Howard A. Alexanderson** was named director of engineering; **Bernard Goldberg**, chief engineer-current products, and **Henry Treeger**, chief engineer-advance sales design.

Personnel Changes . . . Sales and Service

Donald Calkins, previously supervisor of the Methods Department, has been appointed to the post of manager, Con-



D. Calkins



H. Roberts

tract Services, for The Baird Machine Co., Stratford, Conn. . . . **Howard Roberts** has been named to the newly created position of manager of engineering services for the Truarc Retaining Rings Division of Waldes Kohinoor, Inc., Long Island City, N.Y. . . . **B. E. Storrs** is now service engineer with the East-Central District staff of the Metallurgical Products Dept. of

General Electric in Cleveland . . . Two new sales representatives have been announced by Tumb-L-Matic, Inc., Stamford, Conn. **Thomson and Willett Co.** of Haverford, Pa., has been assigned to the eastern Pa., southern N.J., Del. and Md. territory. **Joseph Upton, Jr.**, New York City, will cover metropolitan New York, northern N.J. and the Hudson Valley section as far north as Schenectady . . . **Edward R. Kreberger** has been appointed sales engineer for the Butterfield Div. of the Union Twist Drill Co., Derby Line, Vt., and will cover southern N.J. and the Phila. area with headquarters in Oreland, Pa. . . . Appointment of **Robert C. Bown** as manager, General Products Division sales, Midwest region, and of **F. H. Woodruff** as manager of the Evansville district, has been announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis. . . . **Harry L. Burnham**, recently with the Phillips Mfg. Co. of Chicago, has joined the sales staff of the Ransohoff Co., Hamilton, Ohio. He will act as sales engineer in northern Mo., central Ill., and northern Ind.

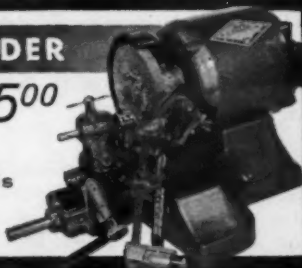
Lisle

DG-3 DRILL GRINDER

Complete, nothing else to buy .. only **\$175⁰⁰**

Easy to operate. Patented feed system assures correct heel clearance, chisel or web angle, and cutting lip angle. Sharpens all $\frac{1}{8}$ " to 1- $\frac{1}{4}$ " drills, with no extra attachments! Write for full details.

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New Dealers and Distributors

Company	Address	Distributor for
Chandler & Farquhar Co. Inc.	500 Commonwealth Ave., Boston, Mass.	Metallurgical Products Dept., General Electric Co., Detroit, Mich.
Allied North West Machine Tool Corp. (for Portland)	1222 S.E. 7th Ave. Portland 14, Ore.	Wallace Supplies Mfg. Co. Chicago, Ill.
Cleveland Duplex Machinery (for Cleveland)	1495 Warren Rd. Lakewood 7, Ohio	Wallace Supplies Mfg. Co. Chicago, Ill.
Harley-Pence Machinery Co. (West Coast)	1805 N. Hillhurst Ave. Los Angeles 27, Calif.	Wallace Supplies Mfg. Co. Chicago, Ill.
Lakeshore Machinery & Supply Co. (Central Michigan)	400 W. Lakaton Ave. Muskegon, Mich.	Wallace Supplies Mfg. Co. Chicago, Ill.
Edward A. Lynch Machinery Co. (Eastern Pa., southern N.J., Md. and Del.)	29 E. Wynnewood Rd., Wynnewood, Pa.	Wallace Supplies Mfg. Co. Chicago, Ill.
Machinery Sales Co. (West Coast)	2838 Leemis Blvd. Los Angeles 58, Calif.	Wallace Supplies Mfg. Co. Chicago, Ill.
Leonard R. Nourie, Inc. (Pittsburgh)	2414 W. Liberty Ave. Pittsburgh 26, Pa.	Wallace Supplies Mfg. Co. Chicago, Ill.
Perine Machinery & Supply Co. (Seattle)	1921 First Ave. So. Seattle 4, Wash.	Wallace Supplies Mfg. Co. Chicago, Ill.
The M. M. Thackaberry, Inc. (West Coast)	1300 S. Solo St., Los Angeles 26, Calif.	Wallace Supplies Mfg. Co. Chicago, Ill.
Foulis Engineering Sales, Ltd. (Maritime provinces)	Halifax, N.S., Can.	Wallace Supplies Mfg. Co. Chicago, Ill.
The Canadian Fairbanks-Morse Co. Ltd. (All provinces not maritime)		Wallace Supplies Mfg. Co. Chicago, Ill.
Williams & Wilson, Ltd. (Ontario and Quebec provinces)		Wallace Supplies Mfg. Co. Chicago, Ill.
William Orlick, Ltd. (Ontario province)	35 Glen Rd. Hamilton, Ont., Can.	Wallace Supplies Mfg. Co. Chicago, Ill.
Alexander & Orlick (Quebec province)	5516 Park Ave. Montreal, Quebec, Can.	Wallace Supplies Mfg. Co. Chicago, Ill.

BOOK REVIEWS

THE GRINDING WHEEL. Wm. F. Schleicher, vice president and editorial director of Hitchcock Publishing Co., Wheaton, Ill., authored the revision. *Grinding Wheel Institute*, 2130 Keith Bldg., Cleveland 15, Ohio, 532 pages. \$4.95

The current revision of *The Grinding Wheel*, based on the 1951 edition, contains over 100 pages of new material, with a total of 532 pages. Entirely new chapters have been written, including

Mounted Wheels, Reinforced Wheels, Automation and Advanced Mechanization, and Safety. Jig grinding, electro-assist grinding, optical projection grinding, filtering of grinding fluids and grinding of ceramics, are some of the new subjects which have been incorporated in standing chapters. Every chapter has been affected by the recent advancements in the science of grinding. These advancements have resulted in additions to such chapters as *The Abrasive Materials*, *Disc Grinding*, *Roll Grinding*, *Costs*, *Evaluation of Surface Quality*, etc.

In looking into the various chapters covered, the *Grinding Fluids* chapter gives the types of fluids and qualities desired in a grinding fluid. *Evaluation*

of Surface Quality covers the equipment, approximate classification of machined surfaces, symbols, etc. A complete summary is provided of the equipment needed for operations in the truing, dressing and balancing chapter. The how-to-do-it type of information in the chapter on tool and cutter sharpening will benefit both operator and supervisor. Factors affecting wheel selection will be enlightening to the user of bonded abrasives. Up-to-date tables of maximum operating speeds and minimum machine spindle sizes are shown in the Safety chapter.

This is a textbook not only for the student, but for the practitioner, whether he be operator or executive.

Correction!

("The Grinding Wheel," as reviewed in the November, 1959 issue, was incorrectly priced at \$3.50. The correct price is \$4.95.)

KINEMATIC ANALYSIS OF MECHANISMS. By Joseph Edward Shigley. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. 351 pages. **\$7.75**

This modern text, written both for the student of engineering and the practicing engineer, gives the reader a solid background in mechanism analysis. Covering the field thoroughly, it stresses basic theory and builds strong methods of analysis.

Graphically and analytical methods are equally emphasized. The traditional graphical method is employed, and two analytical methods of vector analysis have been added. All three methods are applied generally but in easy stages, to both the analysis and the synthesis of mechanisms. Synthesis of mechanisms is dealt with throughout. Space mechanisms and computer mechanisms are also included.

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Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

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1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
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2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

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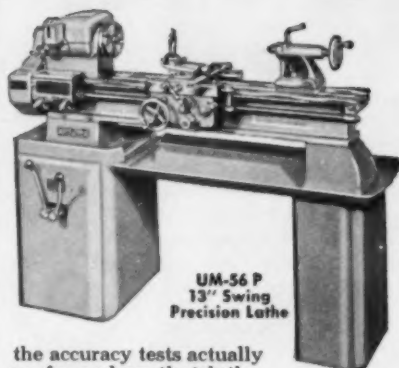
SHELDON Precision LATHES

for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production jobs. They are available with swings of 10", 11" and 13" . . . in varying bed lengths with 18" to 48" center distances . . . and . . . in your choice of pedestal, cabinet or bench mountings.

Powerful, all-V-belt, drive units—either the standard 8-speed (or 16-speed) E-drive; or the production favorite, a rapid, lever-shift U-drive. Where higher spindle speeds are desired, the standard E-drive can be built to provide speeds up to 2,000 r.p.m.

All Sheldon Lathes have handscraped, built-in precision. Each lathe is guaranteed to meet or surpass the American Standards for Toolroom Accuracy. With every Sheldon Lathe goes a copy of

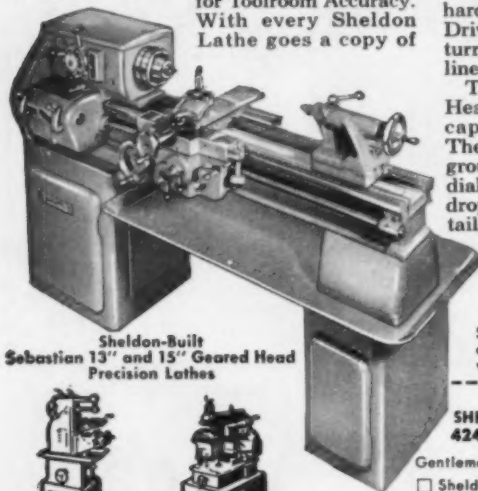


UM-56 P
13" Swing
Precision Lathe

the accuracy tests actually performed on that lathe. (19 checks).

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and apron with "1-shot" lubrication of carriage.



Sheldon-Built
Sebastian 13" and 15" Geared Head
Precision Lathes



SHELDON
Horizontal Milling Machine



SHELDON
12" Shaper

SHELDON MACHINE CO., Inc.

Builders of Sheldon Lathes, Milling Machines, Shapers and Sebastian Lathes.

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Send in coupon or write for catalogs and names of nearest Sheldon and Sebastian Distributors where you can see these new lathes in operation.

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Gentlemen: Please send new catalogs describing:

- ☐ Sheldon ☐ 10", ☐ 11" ☐ 13" Lathes
☐ Sebastian 13" and 15" Geared Head Lathes
☐ Horizontal Milling Machine ☐ Name of Local Dealer
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Name Title

Company Name

Street Address ☐ Company Home

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Conveniently located controls allow the operator to take full advantage of modern cutting tools at maximum feeds.

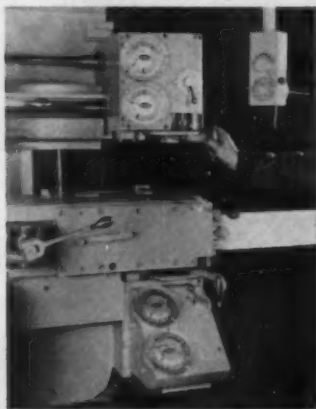
Fully Power-Controlled Vertical Turret Lathes

The Bullard Co. has developed a new series of fully power-controlled vertical turret lathes, reported as the first in the entire world, in nine sizes with table diameters ranging from 26" up to 124". Featured are feed rates directly coupled to the table rpm and infinitely variable through the full range, plus variable traverse rates from 0 to 9 ft. per minute.

The first important advantage of these lathes is a radical new single-lever control for positioning each of the heads, and for engaging or disengaging the tools from the work. It places in the operator's hands all of the controls for starting and stopping the table, traversing the heads, and engaging the cutting tools. This results in less time spent in getting the lathe ready to cut and more time spent in actually cutting.

In the smaller sized machines, the control consists of a horizontally swinging arm with a conveniently shaped pistol

grip, which moves the heads. For the larger sized machines, a remote control system is provided, which is based on the same operating principle. A control pendant is provided from which the operator can regulate table movement, start, stop or inching, and select table speed. In addition, the heads are operated by a compact, lightweight,



A single lever on the feed works controls all directional motions of the head, traverse and feed engagement. Table speed change, start and stop are controlled from the pendant.

portable control box which fits into the operator's palm.

Another provision reported is the development for the first time of a machine with infinitely variable feed rates, rather than the conventional step-by-step feeds. This permits the lathes to be run at all times at the optimum cutting rate for the kind of material and tool in use. Feed rates are indicated on a direct-reading dial. They can be varied while cutting, too, without stopping the table, allowing changes to be made to match changes in stock removal conditions or to adjust for tool-wear.

A new concept in measuring uses large, easy to read, clock-type dials with dual pointers. The graduations and numerals remain stationary while the

pointers rotate, one registering tenths of an inch and the other thousandths of an inch for minute head positioning.

Versatility is offered from simple, yet highly productive, manual operation to complete automation. This is accomplished through the use of the Bullard Man-Au-Trol for completely automatic operation or through point-to-point or continuous path numerical control systems. Other accessories include the Size-Au-Trol for accurate positioning of all heads; contouring attachments; four or five sided power indexing turret heads, etc.

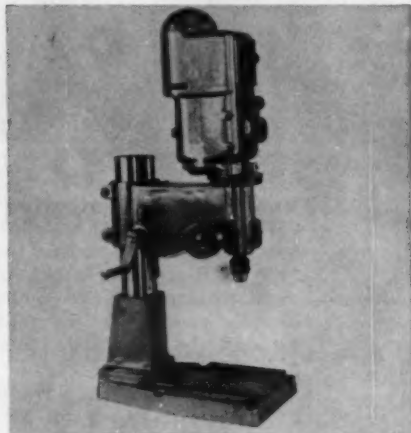
The Bullard Co., Bridgeport, Conn.

Use postpaid card. Circle No. 81

Swedish Drill Press Drills $\frac{3}{8}$ " in Steel

The Swedish Arboga factory has announced a new drill press, the EV-10.

A drilling capacity in steel of $\frac{3}{8}$ " is reported for the machine, with infinitely variable speeds from 1200 to 7200 rpm. The swing is 18" and the

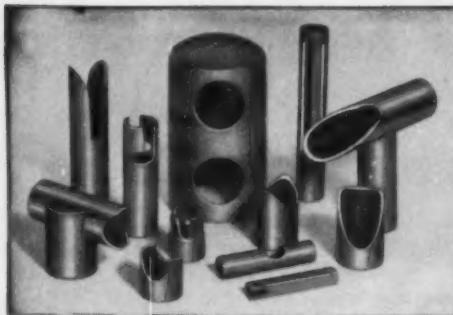


Infinitely variable speeds from 1200-7200 rpm.

quill travel 3". Maximum distance from spindle to table is 12"; table size, 10" x 17".

Homstrand Machine Tool Corp., Greenwich, Connecticut.

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Samples of shearing and notching (also estimates) gladly furnished without obligation.

Look — at these sheared tubular ends — clean, true contoured and close fitting with a minimum of burr and distortion . . . **You can make them fast,** some up to

2000 an hour with Vogel patented tools. Or, if you prefer, we can do your notching, shaping, shearing and perforating . . . Either way

You save on cost!

ARC-FIT® notches up to 720 per hour.

ARC-SNUG prepares pipe ends for snug brazing—up to 500 pieces per hour.

ARC-TWIN® double notches pipe up to 750 pieces per hour.

CUT-OFF shears tubing in two up to 2000 per hour.

VOGEL TOOL & DIE CORPORATION

1827 North 32nd Ave., Stone Park, Ill.

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TIME SAVERS for the Tool Room

. . . and the production line

Do It Faster With A DREMEL MOTO-TOOL

For top-speed, top-precision grinding, polishing, and burring, low-cost Dremel Moto-Tools are your best practical buy. Use them in tool and die work, pattern making, burring operations, and dozens of other applications. They're light and easy to handle. Give you quick access to areas inaccessible for larger grinders. Cool-running universal motor develops 27,000 R.P.M. Smooth operation permits precision accuracy in close-tolerance work, eliminating costly and painstaking hand work.

Model No. 2 Moto-Tool only\$19.95

Model No. 2 Moto-Tool Kit, with 23 accessories, including high-speed cutters, in steel storage case\$27.50

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DREMEL MANUFACTURING CO., Dept. 210-A, Racine, Wis.

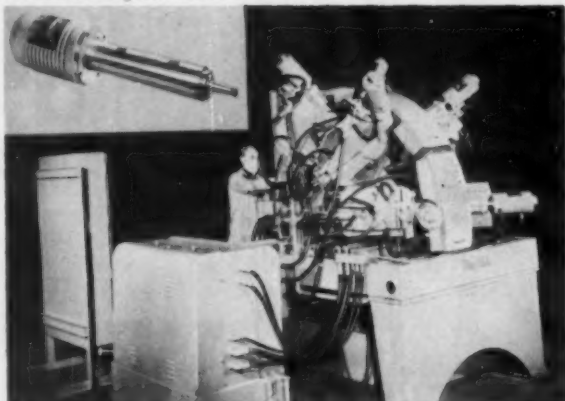
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Three Models of Machine Tool Spindles

The DoAll Company announces the first of a new line of precision spindles featuring safety, great accuracy, and long service life. To fulfill the needs of most original equipment manufacturers and replacement users, three models are available: 3" O.D., belt driven; 1½ hp, 3" O.D., motorized and 1 hp, 3" O.D., motorized.

Although all three are heavy-duty type, using double row bearings, they are no larger than standard spindles and may be used interchangeably with them. The motorized spindles operate at 3450 rpm and are recommended for wheel sizes up to 7" x ½" x 1¼" or 8" for wheels with



This machine uses six precision spindles (insert) in the production of television picture tubes.

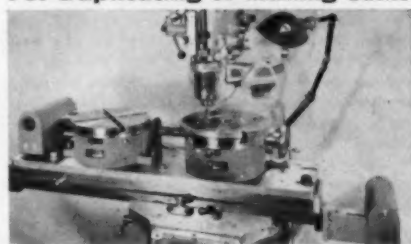
bonds rated for higher than normal peripheral speeds. The belt driven spindle can carry even larger wheels with the belt pulleys arranged for the proper rpm or smaller wheels at spindle speeds up to 5000 rpm.

The MD-6 is a 3" O.D. spindle with integral 1 hp, 3450 rpm motor. Model MD-7 is similar to the MD-6 but uses a 1½ hp motor, BD3-4 is also similar to the MD-6 except that it is belt driven for speeds up to 5000 rpm.

The DoALL Co., Des Plaines, Ill.

Use postpaid card. Circle No. 83

Precision Milling Table For Duplicating or Making Cams



The milling table can be purchased in a number of milling speeds from one revolution every ten minutes to six revolutions a minute.

M & M Tool & Manufacturing Co. announces its new Roto-Mill precision

RIVETERS...

GRANT

PIONEERS
and
PACEMAKERS
in their line



head rivets from smallest to ½" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindle.

Write for literature and don't forget to send samples

THE GRANT MFG. & MACHINE CO.
CE Station Bridgeport 5, Conn.

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milling table designed for single, double, or triple operation for duplicating or making cams. It can be used in a vertical position for special jobs or for fixturing plate for milling slots in parts. It has a 110V-60 cycle motor, forward and reverse, as well as variable speed controls to select the proper cutting speed. Graduations are provided and micro switches can be attached to stop the table and reverse.

The milling table can be purchased

in a number of milling speeds from one revolution every ten minutes to six revolutions a minute. Ample torque is developed by special warning gear drive.

This milling table is available in many different types, and can be made to suit the customer's requirements.

M & M Tool & Manufacturing Co.,
Dayton, Ohio.

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IMMEDIATE DELIVERY OF CONTOUR CUTTERS For Standard Hydraulic Fittings ... *In Stock*

AND 10050 Port Cutters



Turret Lathe and Drill Press Series: Carbide Tipped, integral reamer



Economy Series: Carbide Tipped, integral end pilot



Versatile Series: Carbide Tipped, interchangeable end, pilot and reamer



High Speed Steel Series: Integral end pilot, Super H.S.S.

"MS" Port Cutters



MS 33514: Carbide Tipped integral end pilot



MS 16142 "SAE": Carbide Tipped interchangeable end pilot and reamer

External Flat Form Tools



MS 33656 E and G; MS 33657 E and S Stocked in Carbide Tip and H.S.S.



MS 33514E; MS 33515E and S Stocked in Carbide Tip and H.S.S.

Wetmore stocks the fullest line of Port Contour Cutters and Flat Form Tools for Standard Hydraulic Fittings to assure fast delivery. Where required, modification of standard contours can usually be made within 48 hours.

For Special Cutting Tools, Wetmore offers the finest design and manufacturing facilities backed with extensive experience to combine operations and also to machine "problem parts."

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Wetmore Tool and Engineering Co.

5320 E. Washington Blvd., Los Angeles 22, California

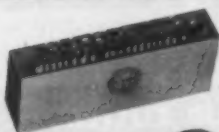


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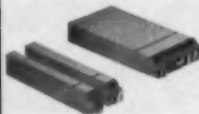
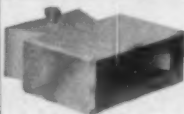
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Matthews Press Stamping Dies are machined, engraved, and heat treated from a choice of over 50 grades of tool steel to provide the most suitable marking for your application.



Roller dies and Flat Roll dies provide the finest marking with the least effort. Precision engraving of correct side bevels provides stress free marking and long die life.



Holders and type for flat and roll marking designed with the same exactness are ideal where frequent changeover is required.

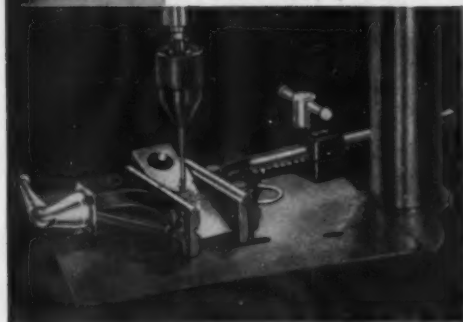
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JAS. H. MATTHEWS & CO.
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Speed production . . . cut costs with

INSTANT CHANGE



AUTOMATIC KEYLESS CHUCK

Lets you change tools in *seconds* without stopping the spindle. One chuck does the work of several spindles, won't chew up tool shanks. The greater the torque, the tighter the grip.

DRILL PRESS VISE

Floats and locks *instantly*, positively, in any position on table. Holds work safely for accurate drilling and tapping. Two models: 9" and 12" capacities.

Write for illustrated folder and name of nearest distributor to AMF Tool Division, American Machine & Foundry Company, 224 Glenwood Ave., Bloomfield, N. J.



WAHLSTROM® / FLOAT-LOCK®
AUTOMATIC CHUCKS SAFETY VISES

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Completely Redesigned Jiffy Shipping Bag

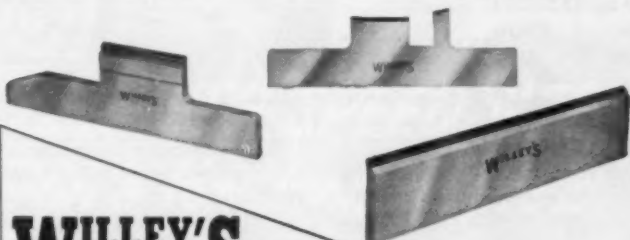
Effective January 1, 1960, the Jiffy shipping bag was completely redesigned. Every Jiffy padded shipping bag is now provided with a tear tape opener, which the manufacturer states makes it the first general use stock packaging material equipped with a built-in opening device.

The bag's outer liner is now made of a golden, rather than brown, Clupak kraft paper. The back of the bag as well as the front will be available for special imprints or instructions.

There is no increase in prices because of the changes.

Jiffy Mfg. Co., Hillside, N.J.

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WILLEY'S CARBIDE WORK SUPPORT BLADES FOR CENTERLESS GRINDERS

FROM STOCK standards & specials

Thru-Feed • In-Feed • Long-Bar
Tube & Rod • Roller In-Feed
Race • Power Race
Heavy Duty

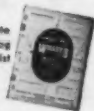
WORK SUPPORT BLADES

for special applications

Many centerless grinding operations require special carbide tipped work support blades for work such as multi-diameter—angular—form—tapered or radius grinding. For more than 20 years Willey's have manufactured these blades to meet specific job applications.

RECONDITIONING SERVICE Willey's regrind or carbide re-tip your worn out, chipped, broken or damaged work support blades to original accuracy... smooth—straight and parallel... a service and savings available to you too!

Write for complete
illustrated catalog
and price list



WILLEY'S CARBIDE TOOL COMPANY

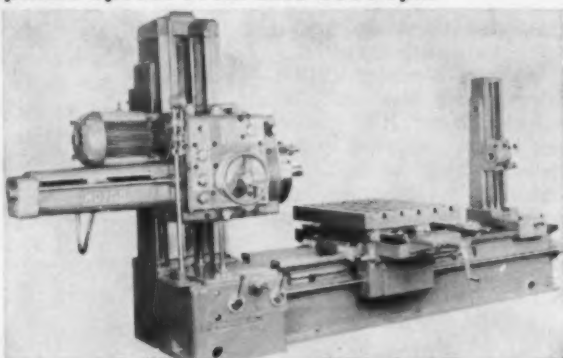
1340 WEST VERNOR HIGHWAY • DETROIT 1, MICHIGAN
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Boring Mill Offers 16 Spindle Speeds From 12.5-1500 rpm

The heavy duty table type 3" Pasquino horizontal boring mill is said to incorporate the finest features of progressive machine tool design, with directly driven spindles running in roller bearings at both ends for extra rigidity. A range of 16 spindle speeds from 12.5-1500 rpm is provided. There are eight speeds from 12.5 to 125, 16 feeds, all progressively arranged.

Some of the outstanding features include a built-in threading arrangement; rotary table, both manually and power operated, and electro limitedly controlled functions for optimum working protection.



Electro limitedly controlled functions afford optimum working protection.

The machine is especially adapted for heavy work for both toolroom and production.

Index Industrial Corp., N.Y.C.

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JEMCO ELECTRIC HAND SHEARS and NIBBLERS

in use by major industries for
over 25 years

10% Greater Efficiency—10% Lower Cost



Nibblers supplied with either standard or with right angle heads to cut corrugated metal.

Nibbler capacities—

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Shear capacities—

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Seneca Falls, N.Y.

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RIVET SPINNING on the **LINLEY**

is fast, low
in cost and
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Produces finely finished rivets faster, even in close places. Send us samples of work to be riveted; without obligation we'll furnish you with a time and cost estimate doing it the Linley way.

Capacities: $\frac{3}{8}$ " diameter rivets in iron and cold rolled steel; larger sizes in softer metals.

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673 State St. Ext. Bridgeport 1, Conn.

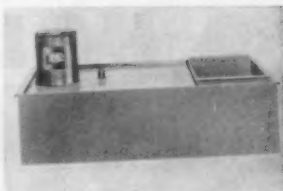
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High Capacity, High Head Coolant System

Graymills Corp. is offering a line of pumping units in the $\frac{3}{4}$ to 2 hp range where relatively high pressures and high volume are required on coolant applications. The one hp model illustrated will deliver up to 10 gpm at a 55' head. This 30-H series is available as pumps only or in 10, 20 and 38 gallon tanks or special tanks of any size or capacity with baffles, chip baskets, filters or even magnetic separators.

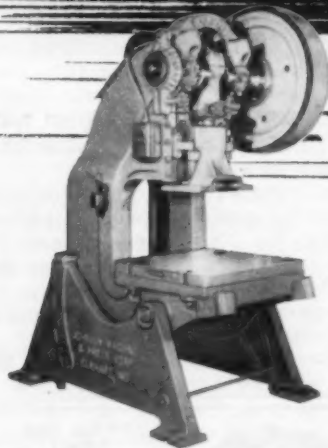
Graymills Corp., Chicago, Ill.

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One hp model mounted in 20-gal. tank.

FOR HIGH SPEED NEEDS on a low tonnage press



CHOOSE JOHNSON!

MODEL 27W (27 TON)

MODEL 45W (45 TON)

MODEL 60W (60 TON)

These presses are especially adapted for handling large lightweight sheets and for notching or piercing off-center operations. And at slower speeds they perform equally well for die cast trimming.

Write for your copy of our complete 8 page catalog No. 59. Covers the complete line in easy-to-read chart form.



Special features of these models

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- Extra Shut Heights • Extra Large Openings Through Backs • Pin Clutch or Air Clutch • Flywheel or Back Geared

Johnson

POWER PRESSES

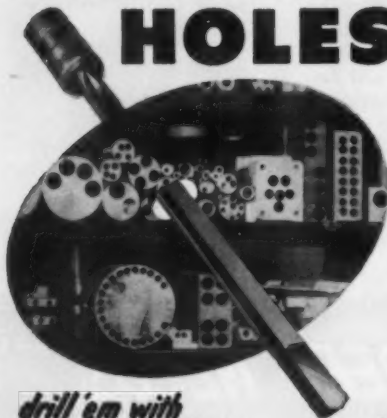
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Division Bontrager Corp.

620 West Indiana Ave., Elkhart, Indiana

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better, faster, more economical

HOLES



drill 'em with

ELDORADO GUN DRILLS

When you drill holes with ELDORADO production proved DRILLS, you solve 'hole' problems in a single operation... assure straightness, micro-finish, perfect size, absolute roundness and precision tolerances. Drill practically any material. Put ELDORADO DRILLS to work on your 'hole' problem, today.

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IN STOCK FOR IMMEDIATE SHIPMENT		
Sizes	1/8" to 1/2" dia. in 64ths	1/2" to 3/4" dia. in 32nds
OA Lengths	10", 16", 22", 36"	16", 22", 36"
Drivers	.750" dia. x 2 3/4" long	1" x 2 3/4" long
Tips	Carbide	Carbide

MADE TO YOUR SPECIFICATIONS

Sizes	.1250" to 2" dia.
OA Lengths	4" to 120" with dia. limits
Drivers	To fit your need
Tips	Carbide



(*) Trade Mark

Specializing 100% in GUN/DEEP HOLE DRILLS and Related Tools.

ELDORADO TOOL & mfg. corp.

338 Boston Post Road • Milford, Conn.

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Rod Shears Provide Fast, Easy Shearing Action

The Nos. 21 and 22 rod shears are actuated by a ball bearing screw movement providing a fast, easy shearing action. All holes are approximately .005 over size thereby shearing rod with a minimum of distortion.

The No. 21 rod shear has 1/8", 5/32", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", and 5/8" round holes; also 1/4", 3/8" and 1/2" square holes. The No. 22



Shears with a minimum of distortion.

unit has 5/8", 11/16", 3/4", 13/16", 7/8", 15/16", and 1" round holes; also 5/8", 3/4", and 7/8" square holes.

Specifications cover a capacity in mild steel of 5/8" round rod and 1/2" square rod for the No. 21 model, and 1" round rod and 7/8" square rod for the No. 22 model.

A convenient stand for mounting the rod shears is also offered.

Whitney Metal Tool Co., Rockford, Ill.

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DRILL and PILOT BUSHINGS

Frictionless — Rotary

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.

Write for details.

GATCO ROTARY BUSHING CO.

42330 Ann Arbor Road, Plymouth, Mich.

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MACHINE and TOOL BLUE BOOK

Miniature Geneva Drives From .250 to .500 Diameter

The Micro-Geneva Drives are said to be precision manufactured to assure accurate indexing, positive locking, high-speed performance and smooth trouble-free operation. The Geneva wheel and driver are composed of alloy steel.

Featured is the miniature cam follower bearing used as the driving roller.

Shaft sizes range from .250 dia. to .500 dia. by 1/16" increments. The units



Precision made to assure accurate indexing. are available from stock in four, six, and eight point drives with driver to wheel center distances from .750 to 2.000 by 1/8" increments.

Miniature Mechanisms, Inc., Tampa.

Use postpaid card. Circle No. 90

New Sharpness Attained In Grinding Discs, Belts

A new line of resin-bonded aluminum oxide coated abrasives with a reported sharpness and cutting life never before attained has been announced. Marketed as Metalite Type 101, it is available on fiber discs and cloth belts.

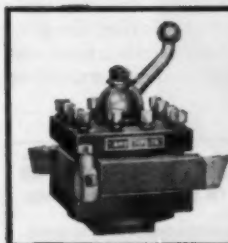
A modification of the Type 101, called 101T and applied to fiber discs in the grit range from 24 to 60 inclusive, has proved particularly effective on stainless steel, brass, bronze and other alloys, where increased abrasive life is said to be accompanied by freedom from heating and discoloration of metal.

Type 101 fiber discs are made in a grit range from 150 through 24, belts from 180 through 24.

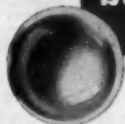
Behr-Manning Co., Troy, N.Y.

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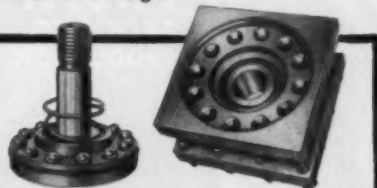
Enco Turrets Assure ±.0005" Accuracy



by
being
on the
ball!



Enco's passion for exacting accuracy is paying off in metal working operations everywhere! Combining precision lathe output with efficiency and economy has become a necessity . . . and Enco turrets have proved the ideal answer. An Enco turret transforms one lathe into a production machine, each operation of unsurpassed accuracy due to *spring loaded ball design!*



Spring loaded balls give you the accuracy you want! Hardened steel precision balls locked between accurately milled spherical seats consistently give accuracy in re-indexing. Hardened all steel construction minimizes wear, retains built in precision.

Also Mfrs. of Enco Hex turret Bed Turrets

Write today for catalog No. 53.

There's an ENCO turret for every lathe.

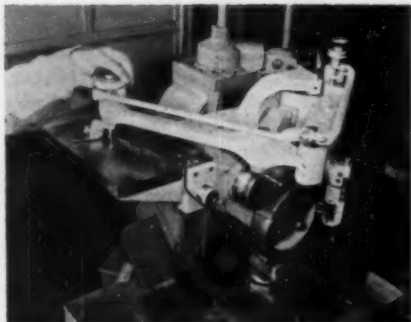
Enco MANUFACTURING CO.

4320 West Fullerton Avenue
Chicago 39, Illinois Dept. 210

Use postpaid card. Circle No. 346

Wheel Forming Attachment For Surface Grinders

Model No. 5 has been added to Pratt & Whitney's line of Diaform wheel forming attachments for use on tool-room surface grinders. Unlike the previous portable attachments, this one is designed for permanent mounting



Instantly available as permanently mounted.

on the machine's spindle head. Then it is available when needed to form-true or re-true the grinding wheel, and yet is out of the way where it will not interfere with the form grinding operation.

To use the attachment, the operator traverses a tracer over the profile of an easily made template and the path of the tracer is transmitted—at a 5:1 or 10:1 reduction ratio—to the truing diamonds which form-true the grinding wheel to the desired shape.

Two sizes are being offered—Model No. 5-1 for surface grinders with table working surfaces of approximately 6" x 18", form-truing grinding wheels up to 7" dia. x 1" face, and the Model No. 5-2 for grinders with table of approximately 8" x 24", and form-truing wheels up to 10" x 2".

Pratt & Whitney Co., Inc., West Hartford, Conn.

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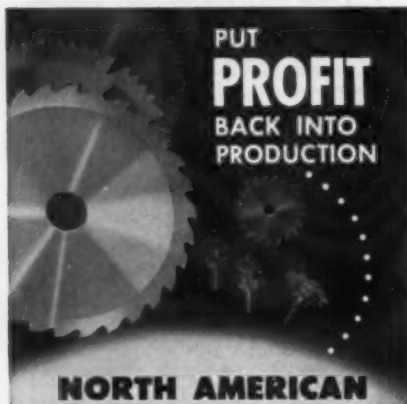
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Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

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PUT
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NORTH AMERICAN

CARBIDE TIPPED SAWS & FINISHING TOOLS

The right tool for the right wood, metal or plastic. Smoother cutting line, no ripping, no chipping. Makes big cuts in replacement and maintenance costs. Write for free catalog today.



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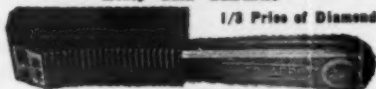
P.O. BOX 291-C, JASPER, INDIANA

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192

New Discovery **LAPS EVERYTHING!** CERAMIC-BRASS-CARBIDE-PLASTIC-STEEL

Lasts for years
Never Leads - Self Cleaning - Indestructible
Money Back Guarantee



1/3 Price of Diamond

GRITS: 180-220-360-500 \$8.75
Newtools Inc. Amityville, New York

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MACHINE and TOOL BLUE BOOK

Shield Eliminates Circular Saw Accidents

This improved aircraft type, shatter resistant, plexiglas shield covers the circular saw allowing full vision and complete accuracy in every type of sawing operation. The manufacturer also states it provides a safe method of making various "heretofore" impossible-to-guard types of cuts and the operator can safely saw in such dangerous operations as mitering, cross cutting, compound mitering, and ripping.

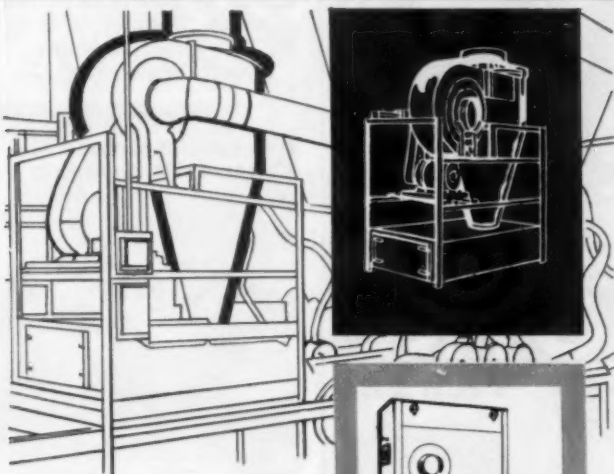
The guard is available for all circular table saws with blades of 6" to 16" in diameter.

Brett-Guard Corp., Englewood, N.J.

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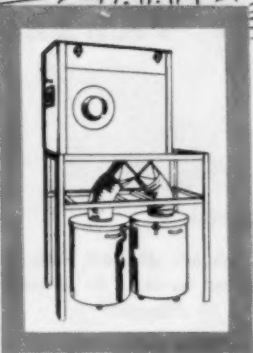
Allows full vision and accuracy in sawing.



Custom dust collection
—with a standard unit . . .

Regardless of your dust collection problem, chances are there is a space-saving Dustkop model to fit the job. Aget, for years, has led the field in efficient, compact design and has developed more than 50 standard Dustkop collectors. Each is job-tailored to most grinding, buffing or finishing operations—as well as many other types of service. Write for illustrated brochure that helps select your tailored Dustkop unit.

Also a complete line of mist collectors



AGET MANUFACTURING COMPANY **DUSTKOP**
1402 EAST CHURCH ST., ADRIAN, MICHIGAN Stops Dust

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Dimpling Machine For Use On High Temp Alloys



Capacity is up to 0.125", depending on fastener type and size.

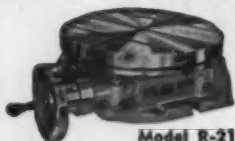
TROYKE ROTARY TABLES

New Design

Greater
Precision

Greater
Rigidity

6 Sizes • 8 Models



Model R-21

Guaranteed 60 seconds or less total accumulative angular error. (60 seconds equals .00087" at 6" diameter.)



Write for FREE Catalog Number 23.



TROYKE MFG. CO.

11296 Orchard Street
Cincinnati 41 (Sharonville), Ohio

Use postpaid card. Circle No. 351

Depending on fastener type and size, dimpling capacity of the Model C-125 Airflex Camtrol dimpling machine is said to be up to 0.125". It will handle the softer alloys as well as the high temperature alloys, including vanadium and manganese alloys of titanium.

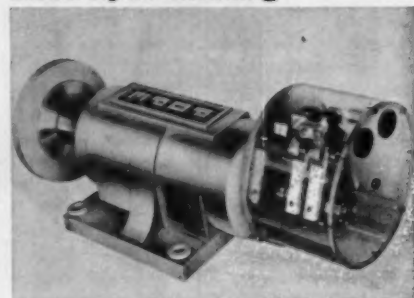
The machine is reported to spin-impact pierce through 0.150", spin-impact rivet through 3/8" mild steel, squeeze rivet and pierce with 13-ton pressure.

High frequency impacts plus spinning re-form delicate metal structures rapidly by minute radial stages without shearing. Work cycle is automatic on the 24" throat machine.

Lemert Engineering Co., Plymouth, Ind.

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Precision Spindles for Electrolytic Grinding



Available from one to 20 hp, with speeds of 900, 1200, 1800 or 3600 rpm.

Pope Machinery Corp., is offering Pope precision spindles for electrolytic grinding. The spindles may be motor or belt driven and are available from 1 to 20 hp, with speeds of 900, 1200, 1800 or 3600 rpm. They are supplied to operate from 50 to 3000 amperes.

These spindles have built-in insulation. They are equipped with a new and rugged fork type, cool operating brush assembly for transmitting low voltage amperage current to the grinding wheel.

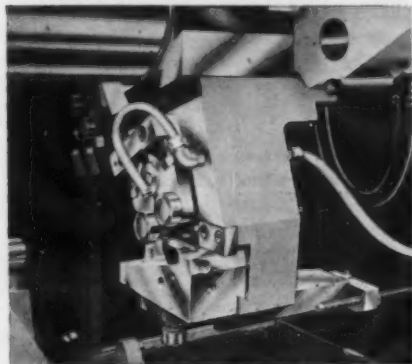
Pope Machinery Corp., Haverhill, Massachusetts.

Use postpaid card. Circle No. 95

Retractable-Cutter Bar Turner For W&S Bar Automatics

Reported as new in the field of single spindle bar automatic tooling, a retractable-cutter bar turner, designed for Warner & Swasey's 2AB single spindle bar automatic, includes highly efficient metal removal with exceptionally close tolerances and smooth, burnished work finishes. Automatic cutter retraction and resetting, according to the manufacturer, eliminate tool withdrawal marks and prolong cutter life.

Capable of handling bars from $\frac{1}{2}$ " to $2\frac{3}{4}$ " dia., the new turner clamps directly in the dovetail of the pentagon turret. One coolant line, emanating



Handles bars from $\frac{1}{2}$ " to $2\frac{3}{4}$ " dia.

from the pentagon coolant distributor, is the only separate connection necessary in mounting the bar turner on the machine.

The Warner & Swasey Co., Cleveland.

Use postpaid card. Circle No. 96

A Full Range Of Swiss Cam Blanks Offered

The American Cam Co. announces that it is now offering a full range of cam blanks for Swiss-type screw machines. AMCAM states that these blanks are made of the best grade of Meehanite and will give excellent wear resistance without heat treating. If desired, they can also be flame hardened.

Available in sizes from $110 \times 7 \times 20$ mm to $190 \times 10 \times 24$ mm, the disk-type Swiss cam blanks are Blanchard ground on both sides. Mounting holes are to a tolerance of $+.0002$ ", $-.0000$ ". Bell-type Swiss cam blanks are available in sizes from $120 \times 52 \times 10$ mm to $160 \times 132 \times 24$ mm. Ring cams are also supplied in a complete range of sizes.

American Cam Co., Hartford, Conn.

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Most Drilling Per Dollar! Veet 3 foot RADIAL



Features Found Only In Highest Priced Radials

Finger-Tip Clutching
Automatic Drill Ejector
Push Button Elevation
Centralized Controls

Hardened Column & Way Inlets
Automatic Depth Control
Timken Bearing Column & Spindle
Head Glides on Ball Bearing Rollers

Refer to Sweet's Machine Tool, File or Hitchcock's Machine Tool Cyclopedia, 1950 editions, for our catalog.

(Send for Brochure of Veet's 16 Points of superiority and name of nearest dealer, who will arrange actual demonstration of the Veet Radial, in your plant, without obligation.)

MAFG. BY **VEET INDUSTRIES**, EAST DETROIT, MICH.
TEL. FRANKLIN 6-3000

Mfrs. of the **VEET High Pro 30" SPEEDMILLER** for Planer Conversions

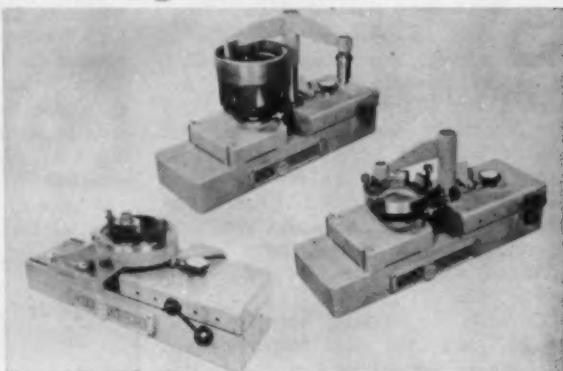
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Gear Rolling Fixtures For Checking Internal Gears

A new line of Red Ring Model GRB gear rolling fixtures has been especially adapted to the checking of internal spur or helical gears.

The movable slide unit at the right in the illustration carries the master gear mounting and the indicator which shows center distance variation resulting from any errors in the gear being checked. A hand lever at the front moves the slide in opposition to the spring loading to permit engagement of the master gear with the work gear.

The gear to be checked is mounted on a fixed base at the left. These fixtures can be of different designs as shown to enable the checking of gear



A variety of new Red Ring rolling fixtures.

tooth accuracies in relation to desired gear dimensions. When the internal gear is of such a design that the master gear cannot be entered from the bottom, the master gear is supported on an arm unit on a post as shown in the gages at the top and at the right.

The gage at the top of the illustration has two arms to enable the checking of both gear tooth runout and minor diameter runout with the same gage. One arm carries a master gear and the other a relieved flat gage unit.

Zero settings for the gage indicator are made by using gage blocks to set proper center distance between master gear and work gear.

National Broach & Machine Co., Detroit, Mich.

Use postpaid card. Circle No. 98

DEPENDABLE ACCURACY



INSPECTION TOOLS made of MEEHANITE METAL—designed to fill your various inspection and checking needs. Sturdily constructed to give you reliable, accurate service. SEND FOR DESCRIPTIVE LITERATURE

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JIG GRINDING and JIG BORING to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.

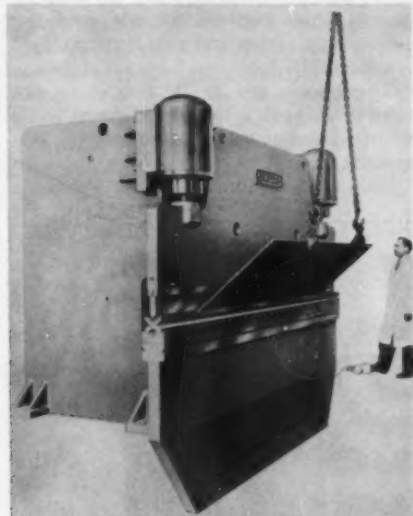
ROUTE 22, MOUNTAINSIDE, N.J.

Telephone: ADams 2-7300

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MACHINE and TOOL BLUE BOOK

Hydraulic Press Brakes Ranging From 200 to 1000 tons



Adjustable top and bottom stroke stops.

A new line of hydraulic press brakes, Series HD ranging from 200 to 1000 tons, is available in 44 models to cover a broad span of bending requirements. Bed and ram lengths are from 8'8" to 24'. The line supplements Niagara's mechanical press brake series which ranges from 15 to 1500 tons.

Principal among the features underscored by Niagara are unitized hydraulic system; rugged hydraulic cylinders keyed to frame for accurate alignment; unique ram leveling and tilt control, requiring no complex hydraulic or electronic devices; self-aligning ball joints with renewable seats; adjustable top and bottom stroke stops, and portable, multi-position foot switch.

Niagara Machine & Tool Works, Buffalo, N.Y.

Use postpaid card. Circle No. 99

New Line of Solid Carbide Fluted Tools

An extensive new line of solid carbide fluted tools is announced by Kenametal, Inc. They include burs, inter-



NEW MAUSER VERNIER CALIPER

**STAINLESS STEEL HARDENED THROUGHOUT
FULLY LUSTRO-CHROME SCALE AND VERNIER**

For Outside, Inside and Depth

6-1/4" Measuring Capacity

Reading Lower Scale — .001"

Reading Upper Scale — .001"

New flush type Vernier eliminates reading parallax

Double length vernier for more accurate and faster readings

Fine Cam-lock adjustment for easy setting at close limits

Overall length 8-1/8"

\$19.75

Lower and Upper Vernier Plates are adjustable (up to .020") for easy recalibration and adjustment

Cat. No. 193 furnished in clear unbreakable polyethylene case

For Complete Information request our 96 Page Catalog — Contact any of our 4 "Coast to Coast" Locations or your nearest Local Distributor.



SCHERR TUMICO

**PRECISION MEASURING
TOOLS AND INSTRUMENTS**

WAREHOUSE STOCK, SHOWROOMS & SALES OFFICES AT
NEW YORK: 200 Lafayette Street, New York 12, N. Y.
ST. JAMES: St. James, Minnesota
LOS ANGELES: 3337 West Olympic Blvd., Los Angeles 19, Cal.
CHICAGO: 5045 W. Harrison, Chicago 44, Ill.

When writing to any of the above locations, refer to Dept. B-1

Use postpaid card. Circle No. 335

nal grinding tools, boring tools, reamers, drills, and routers.

Burs of 46 shapes and sizes up to $\frac{1}{2}$ " diameter are available with six types of cutting surfaces. Internal grinding tools include 17 sizes up to $\frac{3}{8}$ " diameter. Boring tools are made in ten sizes from .090 to 0.360" minimum hole diameter. Reamers with straight, right and left hand spiral flutes are within the size range of 1/16 to $\frac{3}{8}$ " diameter. Flat drills range from 3/32" to $\frac{1}{2}$ " diameter;

drill and countersink combinations from $\frac{1}{8}$ " to $\frac{1}{2}$ " diameter. Standard spiral drills are made in 1/64" steps from 1/16" to $\frac{1}{2}$ " diameter, and in 60 wire gauge sizes. Routers include profiling single flute series and two flute straight router mills.

These tools are in addition to an extensive line of solid carbide end mills which Kennametal announced a few months ago.

Kennametal, Inc., Latrobe, Penn.

Use postpaid card. Circle No. 100



STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

This die head is unique

THERE IS NO OTHER LIKE IT

It cuts threads with insert chasers. These are, in reality, small sections of the business end of large and expensive chasers, but with this important difference: *their cost is so low they can be even thrown away when dull.* For example, for approximately \$50 you can get a dozen sets of insert chasers, each set ground ready to go. Change now to insert chaser die heads and watch your performance improve. "UNIFIED AND AMERICAN SCREW THREAD DIGEST" sent free on request.

THE EASTERN MACHINE SCREW CORP., 25-45 Barclay St., New Haven, Conn.

Use postpaid card. Circle No. 356

Spray Gun Applies Coatings of Materials at 10,000-15,000°F

A new spray gun using the plasma-arc principle is said to develop normal work temperatures of 10,000° to 15,000° F and will spray any material which will melt without decomposing. It is reported practical for applying coatings of high melting-point materials such as zirconium carbide (3540°), tungsten (3370°), tungsten carbide (2850°), etc. The gun operates on inexpensive inert gases such as nitrogen and hydrogen, the use of which eliminates explosion hazards.

Metallizing Engineering Co., Westbury, L.I., N.Y.

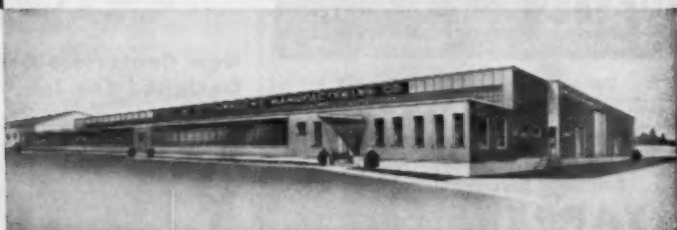


Applying coating on crucible.

Use postpaid card. Circle No. 101



TOWNSEND of Hartford



4
lines of
automatic
machines
integrated
into
1

Big new factory to meet world demand for TOWNSEND Qualimatic MACHINES

The demand for Townsend machinery has quadrupled during the last few years. In order to bring under one roof the engineering, manufacturing, shipping and main offices for all 4 Townsend lines we have built this spacious, modern building. When in Hartford please come and see us.

THE H. P. TOWNSEND MANUFACTURING CO.

- High-Speed Shavers
- Riveters
- Automatic Screw Machines
- Special Machines

TAYLOR and FENN (Machine Division)

- Duplex Spline Millers
- Spring Presses
- Drilling Machines

CLEVELAND TAPPING MACHINE CO.

- Drilling and Tapping Machines
- Fitting Machines
- Indexing Tables

COCHRANE-BLY

- Metal Sawing Machines

The H. P. TOWNSEND MANUFACTURING CO.
HARTFORD 10, CONNECTICUT

Use postpaid card. Circle No. 357

WALLS TU-WAY BELT SANDER



Full
1/3 h.p.
G. E. Motor

USE IT
EITHER WAY

VERTICAL

At last, a top quality industrial sander that provides all the most wanted features—yet sells for so little. **\$89.95**

complete—with cord, plug, switch ready to use

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

Use postpaid card. Circle No. 358

Dorman Automatic Reverse TAPPERS

• Automatic Torque Control

One minute to adjust
Prevent tap breakage

• Easy to Operate

No skill required

• Wide Range of Tap Capacities

No. 1A Friction Drive Tapper—capacity No. 2-56 to 3/8" in steel, 1/2" in aluminum. Also Positive Drive.

No. 2B Positive Tapper—capacity 3/8" to 7/8" in steel.

No. 3A Positive Tapper—capacity 1/2" to 1 1/4" in steel.

No. 4A Tapper—capacity 3/8" to 2" in steel including pipe taps.



Immediate Delivery
Priced
from **\$62.00**

Also Production
Threaders with Round
Split. Button or
Acorn Dies. Write for
Bulletins and Infor-
mation.

Thrifmaster PRODUCTS CORPORATION
a Subsidiary of Thomson Industries, Inc.

1030 N. PLUM STREET • LANCASTER, PENNA.

Also Adjustable and Fixed Center Drillheads

Use postpaid card. Circle No. 359

Tap Extractors Offered With Purchase of Tap Extensions

During the months of January and February all purchasers of a complete No. 9 set of the new Walton tap extensions, Style B, will receive absolutely free a standard set of six Walton tap extractors. This 33% bonus offer is described in a folder released by The Walton Co.

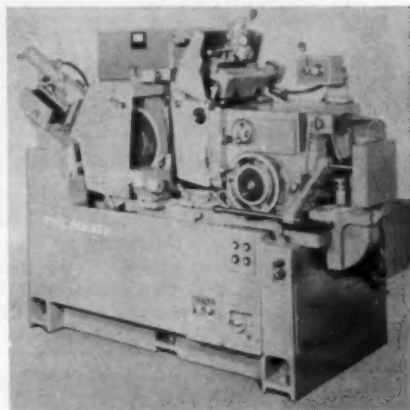
This new set of tap extensions, packed in a metal case, contains nine 8" tools designed to hold standard taps in sizes from No. 0 to 1/2". With this complete set, taps can be quickly lengthened from 8" to 28", for either hand or machine tapping operations.

The purchaser has a choice of three different sets of tap extractors as the bonus.

Complete information is available by writing to The Walton Co., Box 5, Elmwood Branch, Hartford 10, Conn.

Use postpaid card. Circle No. 182

New Centerless Grinder Designed For Job Shop



New cutting fluid mist control unit helps keep operator and floor dry.

The 210-6 centerless grinder, a 10 hp machine, is reported to handle up to 3" O.D. work with a standard wheel width of 6" and provisions for counter-bored wheels up to 8" wide.

Relocation of the cutting fluid tank

MACHINE and TOOL BLUE BOOK

and hydraulic unit, and generous toe-room, allow the operator to stand close to the wheels for work blade adjustment of "dead passing" hand-fed work. A new cutting fluid mist control unit helps keep the floor and operator dry.

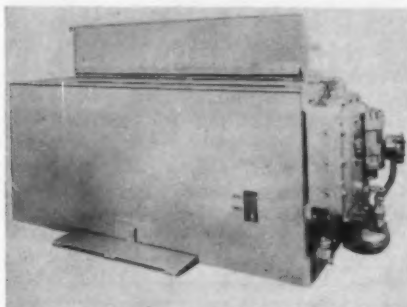
Also in the new Centuramic line are the 220-8, a 20 hp grinder with standard wheel width of 8"; the 325-12, 25 hp, 12" wheel width; the 330-15, 30 hp, 15" width wheel and 340-20, 40 hp, 20" width wheel. The 300 series machines offer wide wheel grinding which permits higher feed rates and fewer passes to obtain a specified size and finish.

Cincinnati Milling Machine Co.

Use postpaid card. Circle No. 103

Automatic Washer Accommodates Large Masks

The Model W-7200 completely automatic high pressure mask washing machine is said to handle masks up to 72" long, 18" wide and 16" deep. However, it can be altered to meet the customer's requirements. The manu-



Handles masks 72" long, 18" wide, 16" deep.

facturer states that the high pressure spray through non-clogging nozzles permits a 50% time and labor saving over manual cleaning.

The time cycle operation is adjustable from three seconds to 20 minutes. A visual gauge shows the fluid level in the 100-gallon capacity tank.

Conforming Matrix Corp., Toledo, O.

Use postpaid card. Circle No. 104

January, 1960

You can do better with...

B-RIGHT-ON®

SOCKET SCREW PRODUCTS

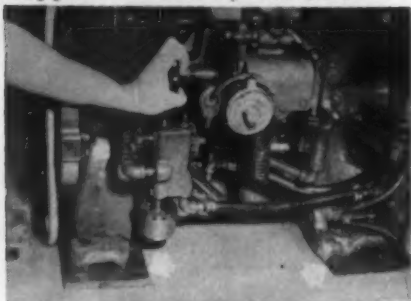
1839 Reading Road

Cincinnati 2, Ohio



Use postpaid card. Circle No. 360

Line of Felt Pads Suppresses Noise, Vibration



Pads are cemented to floor and base of equipment.

A new line of Red-White-N-Blue Vibra-Sorb felt pads comes in two thicknesses, $\frac{1}{2}$ " and 1".

Felt pads are ideal where noise and transmitted vibrations are to be reduced. Another advantage reported is that these pads eliminate the need for lag-bolts or other permanent mountings.

Loads between 10 and 50 psi are

supported by the $\frac{1}{2}$ " thick pads. Where higher intensities are encountered, a single 1" thickness or several layers are recommended.

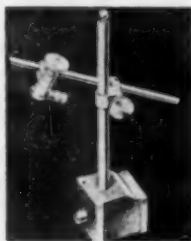
Either size of pad may be ordered cut-to-size, and is also available in 50' rolls, 5' wide. Average material cost (for the $\frac{1}{2}$ " pad) is about four cents per square inch.

Mike Krasilousky Trucking & Millwright Co., Inc., Brooklyn, N.Y.

Use postpaid card. Circle No. 105

Unit Holds All Types Of Dial Indicators

A new model of the Starrett No. 657 magnetic base indicator holder holds all types of dial indicators including rack and pinion models with lug type backs. It also holds the Starrett No. 196 indicator and Starrett No. 711 "Last Word" indicators.



This No. 657AA indicator holder is furnished with the Starrett No. 657 magnetic base which features a powerful permanent magnet and a large diameter push button for turning the magnetic force on or off. The push button permits placing the indicator holder with one hand while the other is free to position the indicator.

The L. S. Starrett Co., Athol, Mass.

Use postpaid card. Circle No. 106

SHARP NAMEPLATE MARKING

Model
No. 4



The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS

- Simple Operation
- Perfect Alignment
- Uniform Depth

GEO. T. SCHMIDT, INC.
1802 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS

Use postpaid card. Circle No. 361



WIND YOUR OWN SPRINGS

Porter Spring
Winder

Widely used to make springs to 1 1/4-inch I.D., for repair, experimental work and small production runs. Low in cost. Handles wire to 3/16" diameter. WRITE FOR CATALOG.

ADVANCE CAR MOVER COMPANY, INC.
APPLETON, WISCONSIN

Use postpaid card. Circle No. 362

MACHINE and TOOL BLUE BOOK

Spindle Speeds Grinding for End Mill Sharpening Fixture

The Air-Flo sharpening fixture, for sharpening end mills and routers, is said to operate virtually without spindle friction. A porting system is engineered to eliminate all metal contact of the spindle which floats on a cushion of air giving the operator's hand a super-sensitive feel.

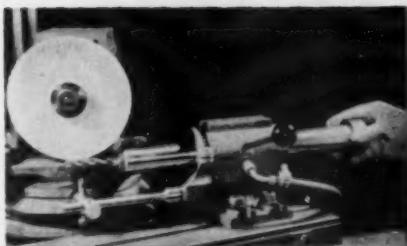
Better grinding finishes are attainable due to smoother spindle action—end mills as small as 1/32" dia. are easily sharpened.

The attachment also grinds either straight or tapered end mills both on periphery and ends. Also ground are routers, shell mills, step drill margins, stagger tooth cutters, specials, etc.

Shank sizes up to 1 1/4" dia. are accommodated on the standard model—larger sizes available as special.

Steptool Corp., Los Angeles, Calif.

Use postpaid card. Circle No. 107



Radial relief sharpening under the wheel.



End teeth sharpening.

LABOR SAVING Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days.

Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.



Top jaws open

Hand lever closes and locks while lathe is running.



Jaws locked



Write for bulletin 201 today.

CHUCK DIVISION

THOMAS HOIST CO.

24 S. HOYNE • CHICAGO 12, ILL.

Use postpaid card. Circle No. 363

January, 1960

6" Universal Dividing Head



with
DIRECT INDEXING

Optional SWIVEL BASE converts a conventional dividing head into a universal work head or rotary table. Change-over is accomplished in seconds without tools or wrenches.

Also available in 10" - 12" sizes and in 10" 12" spiral drive.

Write for Catalog

CARROLL DIVIDING HEAD CO.

3525 Cardiff Ave. • Cincinnati 9, Ohio

Use postpaid card. Circle No. 364

203

Tools for Turret Lathes

The new Tru-Grip tools are reported to be very competitive in price, intended to provide production economy



Heavy construction insures rigidity and close tolerance accuracy through long production runs.

and higher profits. They are machined from high-grade steel, hardened and

ground. Ample, heavy construction insures rigidity and close tolerance accuracy through long production runs. Each tool design is available in three sizes.

Now in production are the Tru-Grip tool holder, drill and facer, knee tool, ball-bearing stock stop, adapter, and the adjustable tool holder. Additional Tru-Grip designed tools will be introduced shortly to supplement the already announced line.

Dimension Products, Culver City, Cal.

Use postpaid card. Circle No. 108

Hole Location Gage

The Model CC-100-V has the indicator axially centered and recessed in the head of the gage so that the indicator is read directly in line with the hole being checked.

Reading the indicator when checking holes at the bench level is also facilitated.

Like other Con-Chek gages in the line, the ground and lapped pilot member remains stationary in its locating hole, while a knurled thumb knob is rotated to actuate an indicator finger which checks the runout on the other hole. This is said to virtually eliminate wear on the pilot.

Mayes Tool Co., Detroit, Michigan.

Use postpaid card. Circle No. 109





**IMMEDIATE
DELIVERY
ON
SOFT
BLANK
TOP JAWS**

SAVE OVER 50%

Soft-Blank Top Jaws are made to American Standards and may be used on any chuck having master jaws made to these specifications. All are in stock and available for immediate delivery.

WRITE TODAY FOR SPECIFICATIONS AND PRICES

HURON MACHINE PRODUCTS INC
P.O. BOX 2274, DEARBORN, MICHIGAN

Use postpaid card. Circle No. 365



At new low price \$124.50
with diamond

New 1959 Model "88"

RADIUS DRESSER

Outperforms them all

Cut production time without sacrificing accuracy! Easy to set, easy to see, eliminates necessity of guard removal. Somerset Radius Dresser turns "tricky" jobs into routine operations. Write for free illustrated folder.

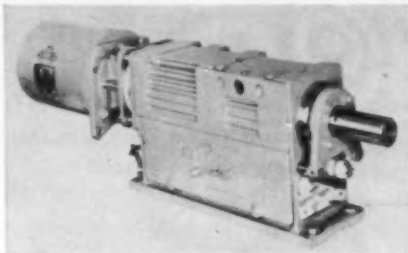
SOMERSET TOOL CO. 244 Virginia St.
Hillside, N. J.

Use postpaid card. Circle No. 366

MACHINE and TOOL BLUE BOOK

Automatic Drill Unit Has Air-Hydraulic Operation

Model 17-400 automatic drill unit is designed for use—with standard Hartford building block components—in automatic production machines engineered to specific job requirements. It features air-hydraulic operation for smooth, positive action. This model is said to contain few moving parts, reducing replacements, and permitting easy maintenance.



Contains few moving parts, reducing replacements.

Other advantages reported are fast positive adjustment for rapid advance, length of feed, rate of feed, and total length of stroke.

Direct, pulley gear, or pulley-driven gear drives can be simplified, offering a wide range of spindle speeds. Spindle motors from 1/3 to 5 hp can be selected, providing torque capacity up to 500 in.lb.

The Hartford Special Machinery Co., Hartford, Connecticut.

Use postpaid card. Circle No. 110

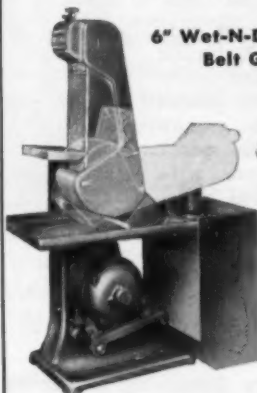
NOW—Polish Plastic Molds— Lap Carbide, Dies & Tools— With Low Cost Tetrabor

- Tetrabor is an oil paste of boron carbide especially compounded for lapping carbide tools and dies.
 - CUT LAPPING COST — Tetrabor costs much less than diamond.
 - INCREASE PRODUCTION—Faster acting Tetrabor permits its use in place of conventional compounds. Gives superior finish.
 - Available in 100 gram tube in a wide range of grits.
- Order trial kit containing 5 grams of 15 grits for \$15.50. Or send for free literature and price list. Dealer inquiries invited.

TITAN TOOL SUPPLY COMPANY, INC.
1419 Hortal Avenue • Box 7
Buffalo 16, New York

Use postpaid card. Circle No. 367

Hammond OF KALAMAZOO



6" Wet-N-Dri Abrasive
Belt Grinder

For FLAT SURFACING

- Castings
- Forgings
- Plastics

Vertical or
Horizontal
Operation

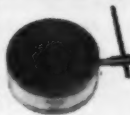
WRITE FOR
CATALOG

Hammond Machinery Builders
1614 Douglas Ave., Kalamazoo, Michigan

Use postpaid card. Circle No. 368

PERMANENT BRAND NEW MAGNETIC CHUCKS AT SENSATIONAL PRICES

Eliminates clumsy fixtures and jigs • Retains holding power indefinitely • Non-Magnetic steel base gives greater stability • Insensible to shock and the effects of cooling fluids • No need of electricity so the danger of short circuits is eliminated.



- Precision made
- Fully guaranteed
- Imported

RECTANGULAR TYPE

Size (inches)	Height (inches)	OUR PRICE
4 x 6	2 3/4	\$ 57.50
4 x 8	2 3/4	62.10
6 x 10	2 3/4	80.50
6 x 14	2 3/4	103.50
6 x 18	2 3/4	161.00
8 x 24	2 3/4	287.50

CIRCULAR TYPE

Dia. (inches)	OUR PRICE
4	\$ 42.55
6	71.30
8	101.20

For tremendous savings, write for free circular

MANHATTAN SUPPLY COMPANY

The Cutting Tool Discount House

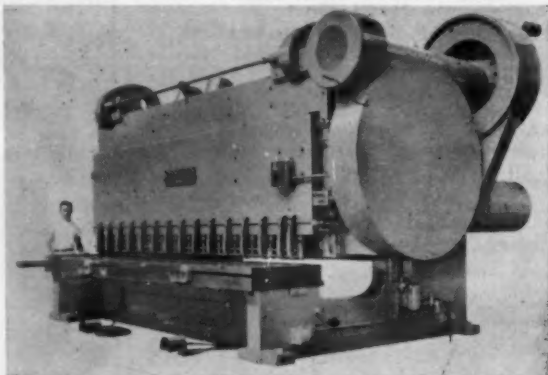
151-A Grand St., New York 13 • CANal 6-4992

Use postpaid card. Circle No. 369

All-Steel Shearing Machine Cuts 1 1/4" Thick Mild Steel Plate

Illustrated is a new series 15014 Cincinnati all-steel shear with a cutting capacity of 1 1/4" thick mild steel plate, 14' long.

Modern features provided include hydraulic holddowns, front operated power back gauge, hinged back gauge angle, automatic pressure lubrication, all-steel interlocked construction, forged alloy steel eccentric shaft. The manufacturer states these features afford outstanding performance with low maintenance and high accuracy.



Series 15014 Cincinnati all-steel shearing machine.

The Cincinnati Shaper Co., Cincinnati.

Use postpaid card. Circle No. 111

Sonic Energy Cleaning Systems

Greater cleaning efficiency and substantial price reductions are reported for the newly revised Bendix sonic energy cleaning systems. Considerably smaller electronic generators can now be used. The firm also states that new improvements have also prevented noise and transducer cooling problems.

The new cleaners are accompanied by new coordinated units for rinsing, drying and filtering, providing for added operating efficiency.

Bendix Aviation Corp., Pioneer-Central Div., Davenport, Iowa.

Use postpaid card. Circle No. 112



Featured are new coordinated units for rinsing, drying and filtering.


Plain Type

CLOSED
TRADE


AUTOM

CLOSED
MARK


Offset Type

CONTINUOUS HINGES

OPEN

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET

AUTO MOULDING & MFG. CO.

1110 E. 87TH ST.

CHICAGO 19, ILL.

Use postpaid card. Circle No. 370

OPEN

SPECIFICATIONS

Open width 7/8" to 6"

Gage Material .040 to .125

Pin Diameter .101 to 5/8"

Lengths to 120"

SEMI-OFFSET

POWERFUL!

**Magne-
LIFT**

POSITIVE!
PROFITABLE!



QUICK-RELEASE MAGNETIC GRIP

Lightweight, easy to hold, makes handling of sheet metal, panels and plates easier, safer, faster and less expensive. Multiple permanent magnet and spacer assemblies are guaranteed to retain their lifting power. Capacity is adjustable for limiting weight of each lift, promoting worker safety. Magne-LIFT simplifies handling, lessens fatigue and cuts costs.

C Write for catalog information and prices
CONCENTRIC TOOL CORPORATION Dept. B-1
2486 Huntington Drive • San Marino, Calif.

Use postpaid card. Circle No. 371

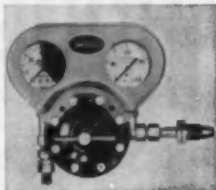


SOLID WEB HAND WHEELS, in straight or offset (dished) web styles, are available in 4" to 15" dias. They provide added safety where wheels turn at high speeds. Composed of fine grained cast iron and cadmium plated, these wheels are offered as castings only, or available machined, with solid handle, revolving handle or no handle. Machine Products Corp., Detroit.

Use postpaid card. Circle No. 113

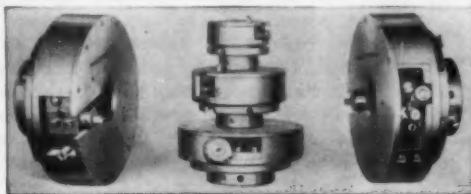
SAFETY REGULATOR. The Saf-T-Pak regulator features the "Hard-hat" which encloses and protects the gauges, the "Flo-trol" on the down stream side which prevents dangerous reverse flow and mixture of gases, and a safety inlet connector which fits the inlet connection to the regulator. Unit is available for use with oxygen, acetylene and LP gases. Smith Welding Equipment Corp., Minneapolis.

Use postpaid card. Circle No. 114



TOOLBOX-SIZED ELECTRONIC INSTRUMENT. This RCA comparator has the ability to make highly accurate spot checks of small parts during a factory production run. It operates on radio frequency to check dimensions of small parts as they move along the production line. Radio Corp. of America, Camden, N.J.

Use postpaid card. Circle No. 115



MUMMERT-DIXON FACING HEADS with Automatic Feed

One-way Tool Feed—8, 9 and 12" sizes.

Two-way Tool Feed—9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes.

Save many costly set-ups.

Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO. 122 Philadelphia St., Hanover, Pa.

Use postpaid card. Circle No. 372

Make
your
mark

with a
HOGGSON
time-tested
**STEEL
STAMP**

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Hoggson stamps are made of finest alloy steel, heat treated to stand continuous impact without breakage of face or mushrooming of body. Available for marking letters, figures or symbols on almost any metal, plastic, or wooden product. Any style letter or figure in face sizes from 1/32" to 1/2".

*Write us for information, or
see your nearest mill supply.*

HOGGSON & PETTIS MFG. CO.

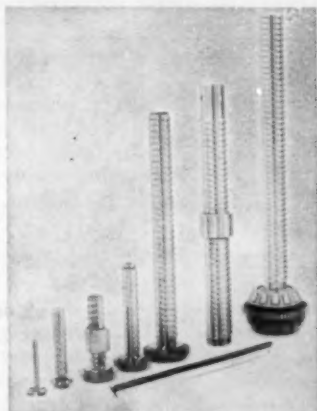
141J Brewery St., New Haven, Conn.

Use postpaid card. Circle No. 373

Ball Screw Actuators Feature Internal Bypass

Recirculating ball screw assemblies feature reported pitch accuracies up to .0002" per foot. There are no obstructions on the O.D. of the nut since balls are recirculated through an internal bypass consisting of a steel insert fitted across each complete turn of the ball groove in the nut.

The manufacturer states that ability



Ball screw actuators include special assemblies with any guaranteed pitch accuracy up to .0002" per ft.

to apply the frictionless ball screw principle, with uniform motion now made possible by precision thread tolerances, is a break-through needed by manufacturers of numerically controlled machines.

Reduced power requirements permit the use of smaller motors, clutches, gear-boxes, and electrical controls.

The ball screw assemblies are designed "special" for each application. Shaft diameters from 1/4" to 5" (and larger on some assemblies) can be made in lengths up to 40' (lengths for .0002" pitch errors are limited to 13' over-all).

Special Products Div., Scully-Jones and Co., Chicago, Illinois.

Use postpaid card. Circle No. 110



Famous Perfection
Grinding Live Center



H.S.S. and Carbide
Accurate Detachable Points



Expansion Compensating
Lathe Centers

ANNOUNCING THE FIRST COMPLETE LINE OF PRECISION-BUILT LIVE CENTERS

INCLUDING 5 TYPES OF
EXPANSION COMPENSATING CENTERS

- the only complete line
- the only guaranteed self-adjusting live center

INTRODUCING J & S Tool Company's complete new line of live centers with accuracy better than .0001", with these features:

- Guaranteed one year.
- Self-adjusting bearing take-up.
- RPM speeds up to capacity of present-day machines.
- Correct capacity rating.
- Hardened and ground throughout.

Write today for a free copy of the J & S Live Center Catalog.

J & S TOOL CO., INC.

882 Dorsa Avenue
LIVINGSTON, NEW JERSEY

J & S TOOL CO., INC., ALSO MANUFACTURERS FLUIDMOTION WHEEL DRESSERS
CLAMPS • NO-BEND MILLING ARBORS AND CLAMPCUT MILLING VISES

Use postpaid card. Circle No. 374

Table Size Dead Weight Beam Torque Tester

This table size beam torque tester is said to rapidly check calibration of various torque tools ranging from 3 in.oz. to 150 ft.lb. It uses the dead weight method of testing torque. Tools tested cover torque screwdrivers and wrenches, including the deflecting beam type torque wrench, rigid frame type, T-handle and micro-set types, etc. Balancing beam is 24" long, pivoted at center, graduated in increments of 1". Removable square adapter fits tools $\frac{1}{4}$ " or $\frac{3}{8}$ " drives.

Apco Mossberg Co., Attleboro, Mass.

Use postpaid card. Circle No. 118



Checks 3 in. oz. to 150 ft. lb. tools.

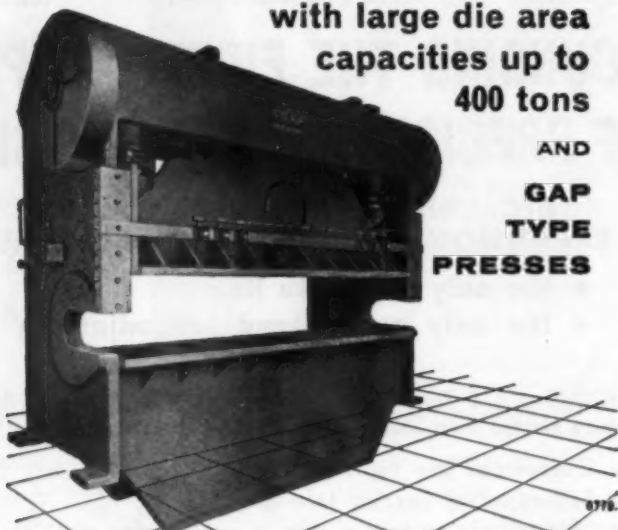


PRESSES

STRAIGHT-SIDE TYPE

with large die area
capacities up to
400 tons

AND
GAP
TYPE
PRESSES



Complete recommendations for any job on request



Press Brakes • Straight-Side-Type Presses • Press Brake Dies
Hand and Power Bending Brakes • Special Metal-Forming Machines

DREIS & KRUMP MANUFACTURING CO.

7448 South Loomis Boulevard, Chicago 36, Illinois

Use postpaid card. Circle No. 375

Finer Pitch Knurls for Hand Knurling Tool

Rockwin Mfg. Co. is now offering 30-pitch as well as 20-pitch knurls with its Knurlmaster hand knurling tool. Provided with three hardened steel knurls in straight or diamond pattern (optional), the knurls are interchangeable so different knurl patterns may be made. There is no need to change from cutting tools to knurling tools. After the part is machined, the knurling tool is clamped over the area and a perfect knurl pattern is generated.

Rockwin Manufacturing Co., Westbury, L.I., N.Y.

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30-pitch as well as 20-pitch knurls offered with tool.

One of these Wilson "Rockwell" instruments will do your hardness testing job

No matter what your hardness testing requirements are, there's a Wilson "Rockwell" tester to do the job. Choose from this complete selection of hardness testing equipment:

"Rockwell" Hardness Tester—for most hardness testing functions.

"Rockwell" Superficial Tester—for extremely shallow indentations.

TwinTester—Combines functions of "Rockwell" and "Rockwell" Superficial testers.

Semi and Fully Automatic—for high-speed testing, at rates up to 1,000 pieces per hour. Automatically classifies pieces as CORRECT, TOO HARD, or TOO SOFT.

Special Machines—for testing large objects, internal readings, and other unusual applications.

Diamond "Brale" Penetrators—Flawless diamonds, individually calibrated, and highest quality construction assure perfect testing every time.



Write for
Bulletin RT-58

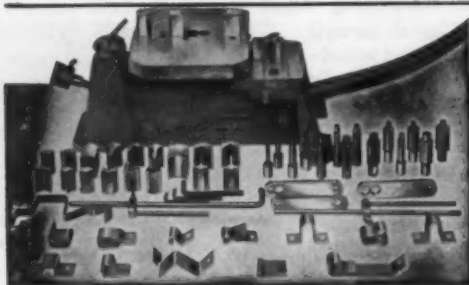
WILSON "ROCKWELL" HARDNESS TESTERS

Wilson Mechanical Instrument Division
American Chain & Cable Company, Inc.

230-T Park Avenue, New York 17, New York

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Multiform BENDER CUTTER

CUTS, BENDS, PUNCHES

Available in hand, air and hydraulic models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend, and cut round or flat brass, bronze, aluminum, steel, etc., up to $\frac{1}{4}$ " x $1\frac{1}{2}$ " as illustrated, other models up to $\frac{1}{2}$ " x 8"

J. A. RICHARDS CO.
KALAMAZOO, MICH.

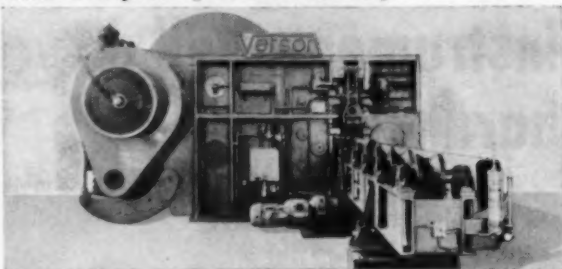
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Bar Billet Shear Operates Completely Automatically

A new heavy duty bar billet shear has capacity to shear 4" R.C.S.—SAE 5140, 115,000 tensile strength bars. It is rated at 700 tons, 1.9" up at point of shear. Production rate is 32 strokes per minute with a 4" stroke at point of shear. It will shear billets up to 6" long at this speed or an 8" long billet at 25 strokes per minute.

Weight of sheared billets is held to a tolerance of plus or minus three ounces. Shear cut length tolerance is plus or minus .020".

Operation of the shear is completely automatic. The machine incorporates power feed conveyor, length gauge, outboard support, hold down and auto-



Shears 4" R.C.S.—SAE 5140, 115,000 tensile strength bars.

matic lubrication. Operating conditions can be selected to provide continuous operation, single stroke-automatic, once-automatic, once-shear only and inch-shear only. Manual operation can be selected for the hold down, outboard support and length gauge to permit operation of these accessories without running the shear.

Verson Allsteel Press Co., Chicago.

Use postpaid card. Circle No. 120



SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists & tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—0025 undersize to facilitate use—Black oxide finish

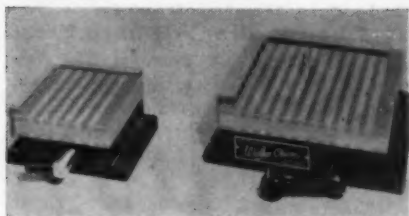
Set No. 3-17, 28 punches with indexed stand—sizes $\frac{3}{32}$ " to $\frac{1}{8}$ ", by $\frac{1}{64}$ "—plus handy $\frac{17}{32}$ " size. Length $4\frac{1}{2}$ " ONLY \$17.00

Single sizes available

R. L. SPELLMAN CO. - URBANA, OHIO

Use postpaid card. Circle No. 378

Small Permanent Magnetic Chucks



4" x 4" & 6" x 6" permanent magnetic chucks.

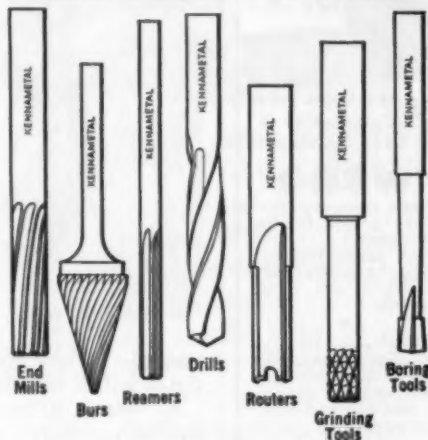
Three new permanent magnetic chucks are available in 4"x4", 4"x8" and 6"x6" sizes.

All three chucks offer the principal features of larger chucks in the O. S. Walker line, including ceramic magnets, all steel face, light weight, low height, and fine pole divisions. Their small size makes these new chucks particularly useful for tool room set-ups.

O. S. Walker Co., Inc., Worcester, Massachusetts.

Use postpaid card. Circle No. 121

KENNAMETAL SOLID CARBIDE FLUTED TOOLS



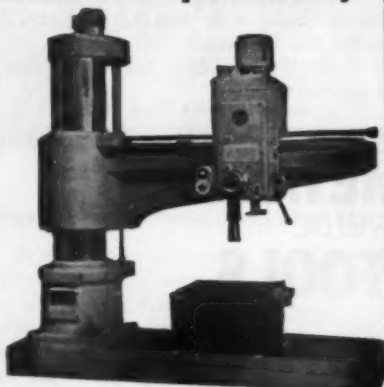
A complete line. Many styles and sizes available from stock. Call your Kennametal Representative for specifications and prices, or write direct. Ask for Catalogs 559 and PS190.

- Machine ground for greater uniformity
- Rigid solid Kennametal for greater machining accuracy
- Provides better finishes
- Ability to cut harder metals

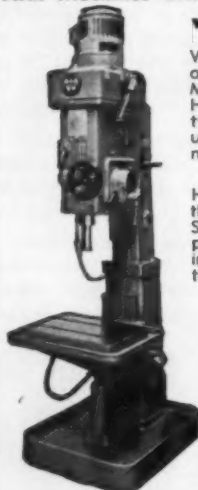
KENNAMETAL Inc.
LATROBE, PENNSYLVANIA

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DRILL PRESSES OF Proven Dependability



WEBO Radial Drilling Machines from 2½' Arm with 9½" Columns to 8' Arm Machines with 19¾" Column.



"WEBO"

World Famous Radial and Upright Drilling Machines. High speed sensitive type to heavy duty upright and radial models.

Hundreds in use throughout the United States. Outstanding in performance and low in first cost and maintenance.

WEBO Upright sensitive and multiple spindle drilling machines. Up to 2½" capacity.

Ask for Literature and Prices for your requirements.

See our exhibit **ASTE Show, Detroit Artillery Armory, April 21-28, Booth No. 555**

Factory Distributors.

**James W. George
MACHINERY CO.**
519 E. JEFFERSON AVE. DETROIT 26, MICH.
WO 1-4522

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Only One Moving Part in 12-T Cap Hydraulic Punch Press

The only moving part in this new cabinet-mounted press is the direct-acting hydraulic cylinder. Available with a 24" or 12" throat depth, it is designated Model 613-A and Model 612-A, respectively.

Capacities in the new units range to 4" through 3/32" mild steel using standard round punch and die sets, and 2½" with standard square punch and die sets, or 9/16" round punch



Available with a 24" or 12" throat depth,

through 1/4"—7/8" through 3/16"—2" through 1/8" mild steel.

Adjustable strippers accommodate all sizes of punch and die sets up to maximum size for extra simplicity of operation.

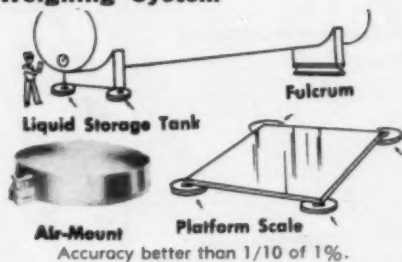
These presses are available with either 1½ or 3-hp, 1800-rpm motors, 220/440 volts. Each model delivers 1½" strokes, 9 strokes per minute at 1½ hp, 15 strokes per minute at 3 hp.

The press can be used in combination with the manufacturer's No. 606 or No. 609 angle iron shear or No. 610 notcher-bend-cope press using but one hydraulic power unit and a two-way selector valve.

W. A. Whitney Mfg. Co., Rockford, Ill.

Use postpaid card. Circle No. 122

Weighing System



The new Weber air-mount weighing system for weighing the contents of bins, tanks, truck tanks, conveyor loads and also anything which can be weighed on platform scales is now available for loads from 0-300 lb. to 0-200,000 lb.

The manufacturer also reports the National Bureau of Standards in Washington, D.C., has calibrated, tested and proved these units to have a repeatable accuracy of better than 1/10 of 1%.

Weber Air-Weigh Co., Detroit, Mich.

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PRECISION DRILL GRINDING:

Black Diamond*



does it better, faster, easier



1 INSERT



2 PUSH



3 TWIST



4 GRIND

Black Diamond Grinders are saving drills . . . saving labor costs . . . saving production time in actually thousands of shops. Reason #1: no drill grinder made does the job so fast and so easily . . . and there's absolutely no skill required! Anybody — yes anybody — can restore like-new sharpness to dull drills with absolute accuracy in just ten seconds!

If your drills, your time and your money are worth saving, you ought to get the facts. They're yours for the asking. Write exclusive distributor:

EDWARD BLAKE COMPANY, INC.

Dept. 5, 570 Pleasant Street, Watertown, Mass. WA 6-8100

*Black Diamond Saw & Machine Works, Inc.

Natick, Mass. — Manufacturers of Black Diamond and Worcester Drill Grinders.

Black Diamond Drill Grinders: For #70 drills up to 3/8"

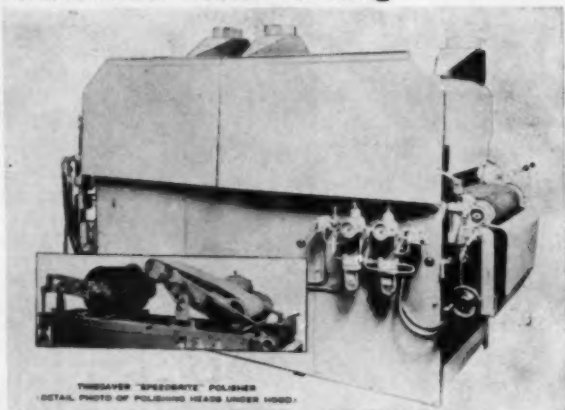
Worcester Drill Grinders: For 3/8" drills up to 2 1/2"

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Metal Polisher Has Two Heads For Better Polishing

The new Timesaver Speed-brite polisher, Model SB, is a dual head machine using a wide abrasive belt head and 3M Scotch-Brite wheel. It can be used for polishing metal sheets, flat stampings or extrusions and strip stock.

Material is fed onto a continuous conveyor belt which passes under both heads. The abrasive belt sanding head provides a floating action which is reported adjustable to fine tolerances to control stock removal. This head removes scratches on the metal, while the rear Scotch-Brite head does the polishing. Unit has hydraulic adjustments for pressure, and operates



TIMESAVER "SPEED-BRITE" POLISHER
DETAIL PHOTO OF POLISHING HEADS UNDER HOOD

Polishes metal sheets, flat stampings, strip stock.

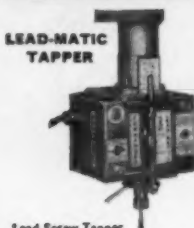
fully automatically.

This model is available in 12" and 18" widths.

Timesaver Sanders, Mpls., Minn.

Use postpaid card, Circle No. 128

COMMANDER TAPPERS



**LEAD-MATIC
TAPPER**
Lead Screw Tapper
Range: 0-80 to 1/4"-16



**PNEU-MATIC
TAPPER**
High Production,
Air Operated
Range: 0-80 to 1/4"-16



**MULTI-
TAPPER**
taps 2 to 15
holes at 1 stroke.
Adjustable
hole pattern



**MIDGET
TAPPER**
Pressure Sensitive Drive
Range: 0-80 to 10-24



**STANDARD
TAPPER**
Adjustable
Torque Control
Range: 0-80 to 1/4"-16

a Type and Size for Every Job!

Commander Tappers are made in 10 models — each designed to handle tapping jobs over a wide range. From the Commander Tapper line, you can select the right unit to give you the exact performance your job requires. Whichever Commander Tapper you select, you will get unequalled performance and tapping economy. Sold and serviced by drilling and tapping specialists. Write for the Commander Production Tool Catalog and name of nearest Distributor.

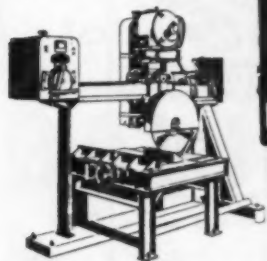


Commander MFG. CO. 4227 W. KINZIE STREET
CHICAGO 24, ILLINOIS

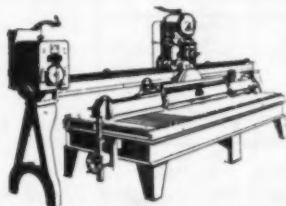
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NEW Friction Saw Cuts Structurals-Rails & Pipe ..

FAST!



SAWS FOR SHORT CUTS



SAWS FOR LONG CUTS

One Piece Construction New Coolant System

These revolutionary new friction saws are one-piece construction . . . need no expensive pits . . . can be moved quickly and cheaply. New coolant system keeps cut hot, blade cool . . . electronic pressure feed eliminates complicated hydraulic system . . . varies pressure as blade moves through different thicknesses. Steel safety shroud reduces noise level . . . stops flying sparks.

FREE BROCHURE

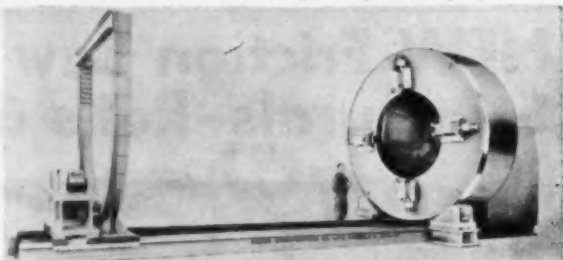
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Ty-Sa-Man
SINCE 1885

TY-SA-MAN Machine Co., Inc.
800 White Ave., Knoxville, Tenn.

14' Swing Spinning Machine Features Accuracy, Adjustability

A 14' swing spinning machine, weighing 80,000 lb., is said to be one of the largest ever built on the West Coast and is being installed at Aerojet - General Corp. in Sacramento, Calif. It is claimed the machine will handle parts for oven curing of plastic



Machine controls provide automatic detection and shut-off should excess vibration occur.

 Severance ELECTRODE DRESSING CUTTERS Used by many to re-condition Electrodes without removing from machines— Down-time is Slashed! Production is Increased! Designed to fit most all popular Electrode Dresser power tools. Special shapes quickly made up. INVESTIGATE! It may pay you much! ASK FOR MORE INFORMATION TODAY!			MIDGET MILLS 
			CHATTERLESS COUNTERSINKS 
			BALL SEAT REAMERS 
			CARBIDE END MILLS 
INSIDE DEBURRING CUTTERS 	OUTSIDE DEBURRING CUTTERS 	TUBE END DEBURRING CUTTERS 	CARBIDE HAND FILES 
HAND DEBURRING CUTTERS 	DISC CUTTERS 	DRILL COUNTERSINKS 	SPECIAL CUTTERS 
Severance TOOL INDUSTRIES INC. 722 IOWA AVENUE SAGINAW, MICHIGAN			REGRINDING SERVICE 

coating up to 150" in dia., 36' long and 60,000 lb.

The chuck is supported during operation by two large rollers mounted on each side of the bed. The chuck's outer rim is ground to close concentricity and is dynamically balanced by counter-opposed and adjustable fixed weights to minimize vibration. Rigidity of parts provide for machine deflection.

Machine controls provide automatic detection and shut-off should excess

vibration occur.

The drive motor controls give infinitely variable speeds from 0 to 150 rpm and are reported accurate within one degree of designated rate of turn at any speed setting.

Since the machine must operate in temperatures up to 180°F for extended periods, water-cooled forced-oil circulation has been provided to lubricate all bearings.

Raven Engineering Co., Los Angeles.
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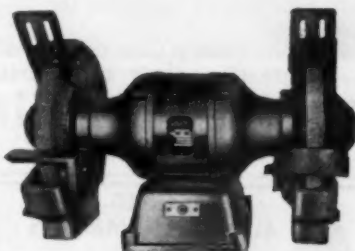
**makes
tough grinding
jobs *Easy!***

BALDOR

MODEL 183-10"

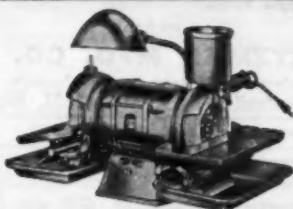
Rugged! Every part oversize to give years of dependable, trouble-free service—even on the most difficult grinding jobs. Ideal for use on large, odd-shaped pieces. Other outstanding features include:

- Rugged $\frac{3}{4}$ HP Baldor motor won't burnout even if repeatedly overloaded!
- Big $\frac{7}{8}$ " arbor . . . extra large ball-bearings!
- Wide-clearance construction provides more working room!
- Dynamically-balanced rotor plus patented wheel balancing process, reduce vibration to a minimum!
- Big 10" fast-cutting, long-lasting wheels!



Single phase, $\frac{3}{4}$, \$162.00
Three phase, 1 HP, \$162.00

CARBIDE TOOL GRINDER



Model 153-6". Reversible $\frac{1}{2}$ HP motor, 3450 RPM. $1\frac{1}{2}$ " wide wheels. Every part oversize for rugged, long-lasting use. Just \$201.80

Write today for Bulletin 321P on complete line of Baldor Grinders and Buffers!

BALDOR ELECTRIC CO.

4353 DUNCAN AVE.

ST. LOUIS 10, MO.

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Suspended Three-Speed Flexible Shaft Machine

The VJ-38 flexible shaft machine has a 5' long $\frac{3}{8}$ " size high speed flexible shaft with a neoprene rubber casing. The hand-piece has high speed ball bearings and an arbor for attachments such as grinding wheels, wire brushes, chucks for drilling, sanding discs, and buffers.



Three speeds can be obtained from the $\frac{1}{4}$ hp 1725 rpm motor: 1725 rpm, 3500 rpm and by reversing the pulleys 1000 rpm.

A swivel hook makes the unit ideal for suspending above the operator's bench.

Stow Mfg. Co., Binghamton, N.Y.

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BALANCED ALLOY LEAD HAMMERS



HANDLES AND MOULDS

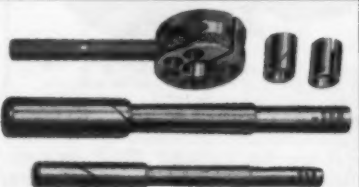
1, $1\frac{1}{2}$, $2\frac{1}{2}$ and 5 lb. sizes—order your alloy lead hammer requirements from your mill supply house.

or direct from:

KITZMAN MFG. CO.

Manufacturers Of Lead Hammer Products
15061 Hartwell Ave. Detroit 27, Mich.

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Catalog furnished upon request

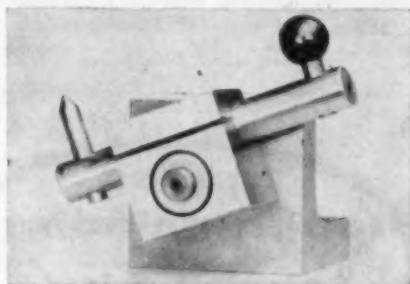
AMERICAN LAP COMPANY 20182 SHERWOOD • DETROIT 34, MICH.

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Improved Chatter and Dust Resistant Angle Dresser

The improved Mighty Midget angle dresser is reported low in cost, dust and chatter resistant.

This angle dresser is made with a hardened, fully enclosed, spring loaded slide, in a honed housing which is easily adjusted for wear. This slide has been tested for over 50,000 strokes, under a bath of grinding dust and lap-



Angle dresser is made with a hardened, fully enclosed, spring loaded slide.

ping compound, with less than .002 wear reported, which was easily adjusted out. When the dust piled up quickly, a dust rag removed it. Nothing had to be taken apart or reset.

The slide is now spring loaded, which makes it much more chatter resistant as it adds a constant tension to the slide.

This slide unit is easily interchanged with all old model Mighty Midget angle dresser slide units.

Sperman Metal Specialties, Brooklyn.

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INTERNAL HELICAL LAPS EXTERNAL

FINE GRAIN LAP IRON

Helical slot in lap gives faster lapping action and longer lap life—entire area in contact with work. Tapered arbor and I.D. of internal lap permit true expansion. External holder is retractable.

Holes with or without interruptions lapped true to 1 millionth.

SIZES

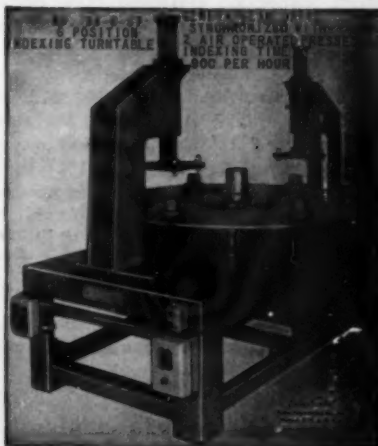
Internal: $1/16$ " to $1-1/4$ " by 64ths, $1-5/16$ " to 3" by 16ths.

External: $1/8$ " to $1/2$ " by 64ths, $17/32$ " to 1" by 32nds, $1-1/16$ " to 2" by 16ths.

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INDEXING MACHINERY — CAMS — GENEVA GEARS — TURNTABLES

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DIFFERENT TYPES OF
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762 SOUTH 13TH STREET NEWARK 3, NEW JERSEY

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economically priced
**PRESS ROOM
EQUIPMENT**

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TOOL COMPANY
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Our nearby
representatives will
be pleased to be
of service to you
without
obligation.



DOUBLE STOCK REELS
from \$395.00



**Motor Driven Stock Straight-
eners, 13 Models from \$682.**

Write for new, free catalog detailing a complete
selection of Die Set Pullers, Roll Feeds, Punch Hold-
ers, Wire Straighteners, and Standard Stock
Straighteners. . . . Over 100 necessary pieces of
equipment for the modern press room.



**STOCK OILERS, 5 Models from
\$41.80**



**Motor Driven Scrap Choppers,
4 Models from \$235.**

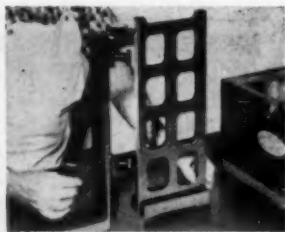
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90° Indicator Gage

This indicator gage is designed primarily for tool-room, inspection and production personnel to accurately check 90° work angles. It can also be used in conjunction with Robbins angular sine plates to check the precision of angles other than 90°. The gage is furnished complete with dial indicator, "Master" square and a box for storage. Distance between the two contact points can be quickly changed over a range from 1½" to 17¾". A wide range of work sizes can be accurately gaged.

Omer E. Robbins Co., Detroit, Mich.

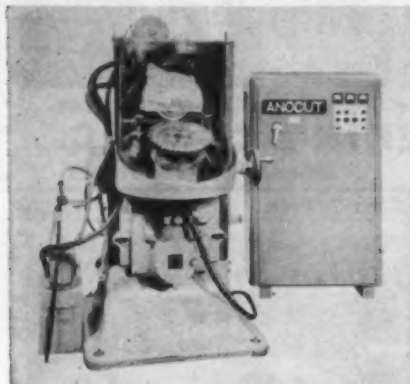
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Furnished with dial indicator, "Master" square and storage box.

Face Mill Grinder Employs Electrolytic Stock Removal

The electrolytic grinding process has been applied to this automatic face mill



Four machine sizes accommodate face mills from 4" to 21" in diameter.

grinder, with a reported savings in diamond wheel costs and cutter life. Carbide insert cracking and checking is

said to be eliminated.

The machine operation is completely automatic in grinding the lead angle, corner radius, face radius, dish and soft steel backing of face mill teeth. A simple cam arrangement controls tooth shape. Cutter indexes automatically for any number of teeth.

Four machine sizes accommodate face mills from 4" to 21" in diameter.

Oliver Instrument Co., Adrian, Mich.

Use postpaid card. Circle No. 128

Serial Numbering Press Numbers 4500 Pieces Per Hour

Model 531 high speed, serial numbering press is air operated, electrically controlled, fully automatic and reported capable of numbering 4500 pieces per hour. It is shown tooled for consecutively numbering name plates through the use of a Noblewest automatic numbering head which advances one digit with each up stroke of the press.

Features reported include a fully ad-

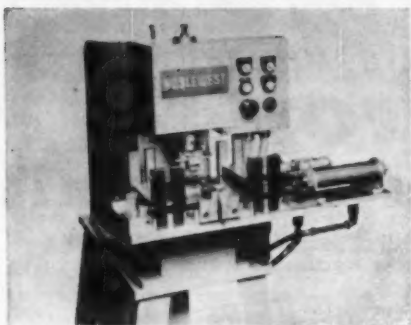
**ELISHA
PENNIMAN**

**Elmwood 10,
Conn.**



**MYFORD
SUPER SEVEN**

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Air operated, fully automatic.

justable machine speed, fully adjustable ram pressure up to eight tons, and interchangeability of magazines from one plate size to another.

If preferred, the basic press is available with tooling for single station marking, forming, bending, etc.

Noble & Westbrook Mfg. Co., East Hartford, Connecticut.

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HI-DUTY

HIGH SPEED

TWIST DRILLS

Unexcelled in Quality and Performance for 57 Years!

COMPLETE RANGE of SIZES and STYLES

- Flat Twisted Drills • Rolled Section Drills • Milled Type Drills
- Special Drills • Step Drills
- Polished Flutes

FAST DELIVERY! Contact your Industrial Supplier or write today for Catalog and Price List. Inquiries from representatives and distributors invited.

HI-DUTY DRILL WORKS

Division of Hi-Duty Industries, Inc.
FLEETWOOD, PA.

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January, 1960

NEW!

CARBIDE DISPOSABLE TOOL GRINDER

(Semi-Automatic)



GRINDS ANY SHAPE OR RADIUS

Holds sides and radius perfect tangent. Will hold .0005 tolerance. Will grind negative or positive angle tools. One operator can easily operate two machines. Will regrind your used blanks at a small fraction of their original cost.

Write for further information

HARVILL-JOHNSON CORP.

610 EAST TEN-MILE ROAD
HAZEL PARK, MICH. PH. Jordan 4-6110

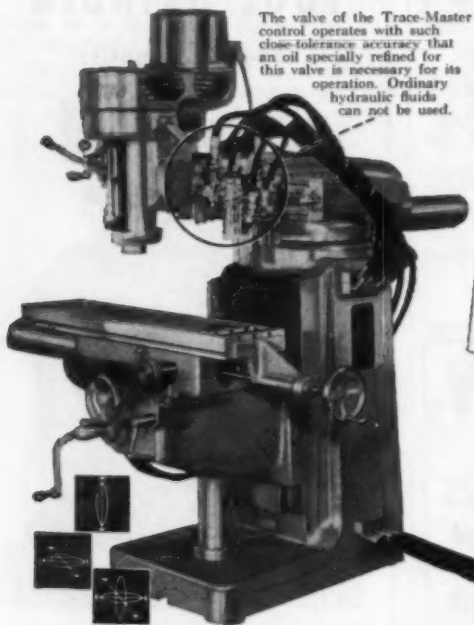
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Designed for the "Missile Age"

GORTON

"Trace-Master" Mastermil

with exclusive combination of sustained toolroom accuracy
and precision-built Trace-Master Hydraulic tracer control



The valve of the Trace-Master control operates with such close-tolerance accuracy that an oil specially refined for this valve is necessary for its operation. Ordinary hydraulic fluids can not be used.

Nowhere Else will you find this combination

1. TWO H.P. spindle motor
2. Finest Milling Head in its class
3. 80 to 5,600 RPM spindle speeds
4. Rigidity ... (2,800 lbs net weight)
5. Extra long saddle

Nowhere Else will you find this versatility

1. Production profiling
2. Scanning
3. Duplicating ... die and mold work
4. Milling ... conventional and climb
5. Boring

3 Models Available (1) 180° Vertical Hydraulic Feed to Knee (2) 360° Cross Hydraulic Feed to Ram and Longitudinal Hydraulic Feed to Table (3) 3D Hydraulic feed to knee, ram and table for 3-dimensional work. Trace-Master controls can be furnished with the Model 1-22 Mastermil illustrated above or the Model 9-J Super-Speed Vertical Mill with single spindle, twin spindles and/or six inch higher column for additional vertical capacity.

Write for Bulletin



GEORGE **GORTON** MACHINE CO.

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RACINE, WISCONSIN

SINCE 1893

Tracer-Controlled Pantographs, Duplicators—standard and special... Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

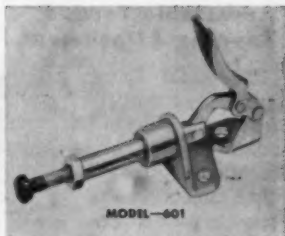
Use postpaid card. Circle No. 393

MACHINE and TOOL BLUE BOOK

Plunger-Type Toggle Clamps

Two new plunger-type toggle clamps have been added to the standard line of De-Sta-Co clamps. They are designed for light assembly work of the electronics, aircraft, and allied industries. The Model 601 and Model 601-0 have a rated holding pressure of 95 lb. Model 601 has a tapped hole in the plunger to take a rubber-tipped adjustment spindle and lock nut for extending or shortening its reach. The 601-0 has a $\frac{1}{4}$ -20 thread on the plunger end for easy positioning of the holding devices.

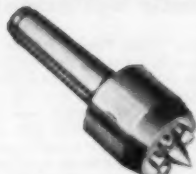
Detroit Stamping Co., Detroit, Michigan.



95 lb. holding pressure is provided.

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New "Driving Center" Introduces Faster Machining Techniques on Work Held Between Centers



Eliminates Chucks and Clamps...Permits Full End-to-End Machining... "Loads" or "Unloads" without Stopping

Designed to increase both output and accuracy, the new Ideal Driving Center grips end face of work and eliminates need for chucks, dogs or other clamping devices . . . Work may be machined end-to-end without removal—usually can be loaded and unloaded without stopping . . . Rigid direct-drive action reduces backlash—prevents slippage—simplifies indexing on gear hobbars and mills . . . No preliminary machining needed; self-compensating pins grip and hold non-uniform work ends—even odd shaped pieces . . . 63 combinations fit maximum work diameters from $\frac{7}{8}$ " to $6\frac{3}{8}$ ", in Morse tapers 2 to 6. Larger sizes may be had as specials.

MAIL COUPON FOR COMPLETE DETAILS



1441-A Park Ave.
Sycamore, Illinois

Please send me complete engineering data and selection chart for IDEAL Driving Centers.

Name

Company

Address

City..... Zone..... State.....

Use postpaid card. Circle No. 394

Adjustable Torque Tapping Attachment

Tapmatic Corp. announces that its new Tapmatic 500A tapping attachment more than meets torque and speed requirements needed for the new fluteless taps, as well as all stand-



ard taps. Recommended maximum speed is 2000 rpm, and at this speed the unit reverses at 3009 rpm. It is reported ideal for high production or automated set-ups.

Incorporated are easy-to-adjust torque control graduations.

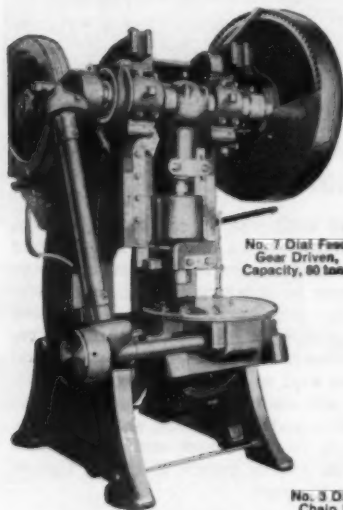
Specifications provided include capacity No. 4 to 5/16-18 in tool steel; weight 2 lb. 12 oz.; length 5½", and 2-23/32" diameter.

Tapmatic Corp., Costa Mesa, Calif.

Use postpaid card. Circle No. 117

Modern FEDERAL Dial Feeds give you automation at less cost!

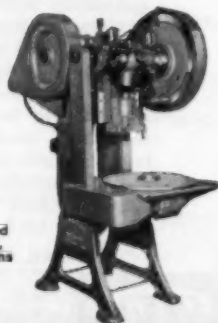
— eliminate specialized, more costly equipment!



No. 7 Dial Feed
Gear Driven,
Capacity, 80 tons

Federal Dial Feeds are your answer to greater production at lower costs. Equipped with special jiggling, automatic feeds and ejectors, their applications are virtually unlimited and the need for specialized, more costly equipment is often eliminated. (One manufacturer increased production 600%.)

Add Federal's quality features and workmanship...and you've got a winner. Gear or chain driven with cam-type indexing mechanisms. Sizes 6 to 80 tons.



No. 3 Dial Feed
Chain Driven,
Capacity, 26 tons

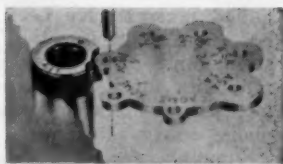
FEDERAL PRESS COMPANY
910 Division St., Elkhart, Indiana

FEDERAL DIAL FEED PRESSES

33 Years' Experience in Dial Feed Engineering and Construction

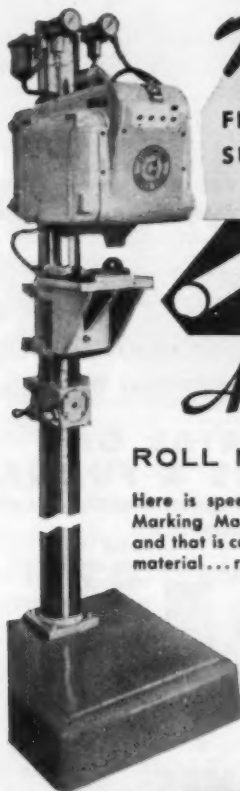
Lock Screw Locating Jig Offered

To enable engineers, shop people and purchasing agents to almost instantly locate precise location for drilling and tapping of lock screws, a plastic lock screw locating jig is now available free upon request from the Acme Industrial Co. of Chicago. Designed to locate all sizes of A.S.A. and Acme lock screws, the unit is a compact tool $\frac{1}{8}$ " thick, with diameter approximately $2\frac{1}{2}$ ". The proper radius is merely fit into the milling of a slip fit bushing and the exact location for drilling and tapping is then readily provided by the center punch.



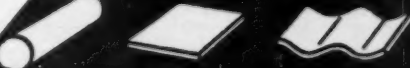
Locates all sizes A.S.A. & Acme lock screws.

Use postpaid card. Circle No. 133



Now! MARK
FLAT, ROUND, CONTOURED
SURFACES *at* HIGH SPEEDS!

MARKS ANY SHAPE



WITH
Automark
(MODEL HRMA)
ROLL MARKING MACHINE

Here is speed, versatility and adaptability in a Marking Machine that operates by air pressure and that is controlled electrically. Marks any shape material... round, flat or contoured.

**CUTS PRODUCTION COSTS...
GREATLY INCREASES OUTPUT**

The Automark operates at speeds up to 6,000 or more 1-inch strokes per hour, or 1,400 strokes per hour on stroke of ram and die slide combination. Think of all the saving in time and money with Automarks in your shop!

**AUTOMATIC FEEDS *and*
FIXTURES MAY BE SUPPLIED...**

**SEND FOR
BULLETIN**

DEFIANCE MACHINE & TOOL CO.

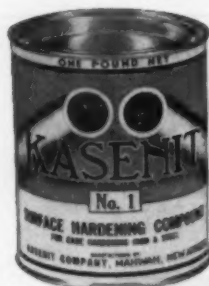
1922 S. VANDEVENTER Dept. MT ST. LOUIS 10, MO

Use postpaid card. Circle No. 397

Compact Precision Presses For Straightening, Heavy Broaching

A new line of compact, self-contained presses have been designed to be completely sensitive to delicate straightening, yet providing maximum reliability for heavy broaching, riveting, forcing, marking, swaging, or complex special applications.

Smoothly variable press speeds and controlled fluid power are said to assure sensitive finger-tip operator control of ram speed, force, travel and



SPEEDY-SAFE NON-POISONOUS CASE

HARDENING

Indispensable for Tool Rooms, Machine Shops, Schools, etc. Now available in 1, 5, 10, 25, 50 and 100 lb. containers

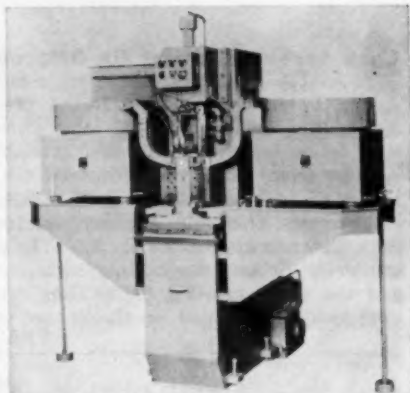
Write for Free Catalog

KASENIT CO.

Est. 1912

1 King St., Mahwah, N.J.

Use postpaid card. Circle No. 398



One-ton special Gooseneck press with a 12" throat designed to broach 3/16" radius groove in a pinion.

direction of movement through each phase of press operation. Fully automatic and semi-automatic electrical controls also are available.

Built to specifications, the new presses are available in sizes from two to several hundred tons. Interchangeable

NOTHING

heats like...

is more modern than...

is more economical than...

GAS



INDUSTRIAL GAS BURNERS & FURNACES

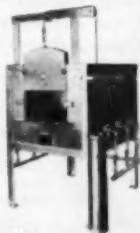
for Clean, Fast, Quiet Heat-Up at Lowest Cost!

**HIGH SPEED FULL
MUFFLE FURNACES**
Bench type for heat treating high speed and alloy steels. Temperatures to 2400° F.



**LARGE FLOOR
TYPE OVEN
FURNACES**

For universal heat treating of larger pieces. Temperatures to 2000° F.



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complete
"BUZZER"
CATALOG



Est. 1911

CHARLES A. HONES, INC.

129 So. Grand Avenue, Baldwin, L.I., New York • Baldwin 3-1110

"BUZZER" Burners & Furnaces for Heat Treating, Melting, Soldering

Use postpaid card. Circle No. 399

work handling devices, indexing mechanisms, hopper feeds, etc., may be added. A complete range of press sizes and strokes is available.

Detroit Broach & Machine Co.,
Rochester, Mich.

Use postpaid card. Circle No. 134

High E. P. Viscosity Coolant For Broaching and Rifling

The Shear-Speed non-irritating H-109 coolant has been formulated to provide the necessary cooling and load

carrying properties to handle the toughest cutting problems.

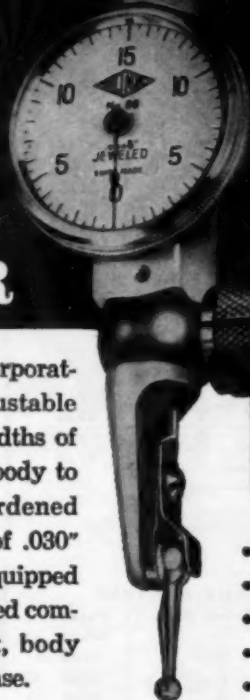
The coolant is said to provide excellent chip-load distribution through its maximum chemical activity. It is also reported to do an outstanding job in machining improved finishes, under E.P. conditions, on internal horizontal broaching and rifling operations on soft, tough or stringy metals.

Shear-Speed Chemical Products, Div.
of Michigan Tool Co., Detroit, Mich.

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ALINA DIAL TEST INDICATOR

A fully reversible indicator incorporating a clear easy-to-read, adjustable dial, graduated in half thousandths of an inch, a switch lever on the body to reverse action and TWO hardened chrome plated contact points of .030" and .100" diameter that are equipped with a non-slip ratchet. Furnished complete with a universal shank, body clamp, and plush lined steel case.



No. 88

- JEWELLED
- GRADUATED .0005"
- READING 0-15-0
- RANGE .030"
- SHOCK PROOF



WRITE FOR LITERATURE AND COMPLETE CATALOG

ALINA CORPORATION

122 East Second St., Mineola, L.I., N.Y.

Use postpaid card. Circle No. 400

Coating Prevents Scale Forming On Metal During Heating

A new coating, trademarked Skalix, is said to prevent scale formation on metal during heat treatment, providing faster and cheaper heat treatment of metals. Applied by spraying or dipping, the new scale preventative adheres to the metal at furnace temperatures forming an oxygen-tight seal. As the



It spalls off. Three test plates of 15-7 PH coated with Skalix and treated in an oxidizing atmosphere for 30 minutes at 1950° F. The plates were totally free of scale and the coating spalled off.

metal cools, the coating pops off by itself. In many cases no further processing is reported.

Applications include stainless steel, nickel-chrome alloys, cobalt alloys, copper alloys, and the new exotic alloys.

Marketed by Navan Products, Inc., subsidiary of North American Aviation, Inc., Los Angeles, Calif.

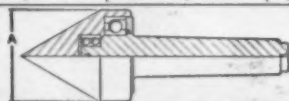
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LIVE CENTERS



LIVE CENTERS

Head No.	Morse Taper	Price
2	2	\$28.00
3	3	32.50
4	4	40.00
5	5	52.00
6	6	75.00
7	7	295.00



TUBING CENTER SPECS.

Hd. No.	"A"	Morse Taper	Price
2	1 7/8"	2	\$32.00
3	2 3/8"	3	40.00
4	2 3/4"	4	43.00
5	3 1/4"	5	57.00



STRAIGHT SHANK CENTERS

Hd. No.	Shank Size	Price
3	1"	\$40.00
4	1 1/2"	53.00
5	1 3/4"	65.00
5	2"	75.00
6	2 1/2"	85.00

Head of any other size and shape can be furnished to specs. Standard shanks made with Morse tapers, other tapers special, always specify Head and Taper—4 page catalog on request.

STURDIMATIC TOOL COMPANY
3970 F St., DETROIT 16, MICH.

Use postpaid card. Circle No. 401

DRILL THESE HOLES

BY A QUICK, EASY INEXPENSIVE METHOD
Your business letterhead will bring literature
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

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READ TEMPERATURES
ACCURATELY
with



PYRO
SURFACE PYROMETER

Send for FREE catalog No. 168

PYROMETER INSTRUMENT CO., INC.
Barnesville, Md., New Jersey

Use postpaid card. Circle No. 403

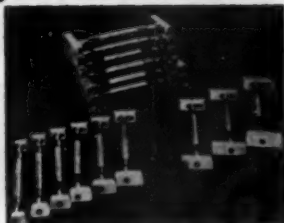
MACHINE and TOOL BLUE BOOK

Easily Adjustable Torus-Design Bore Gages

A new line of easily adjustable torus-design bore gages are being offered as permanently usable and adjustable to changing machining dimensions. They check any combination of holes from 1" through 6" with an economical inventory of only 15 gages. The range of adjustment reported possible in 1" to 1½" gages is .130", in the 1½" to 2½" gages is .260", and in the balance of the gages through 6" is .510".

Maxwell Industries, Inc., Ashtabula, Ohio.

Use postpaid card. Circle No. 137



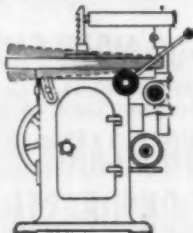
Checks combination of holes, 1"-6".



HIGH-SPEED
LOW-COST
KEYWAYS

WITH DAVIS KEYSEATERS!

You can cut accurate, low-cost internal keyways at *minimum* cost with Davis Keyseaters. Here's why: (1) operation is designed for production *speed*; (2) machine sets up easily, does *not* require skilled operator; (3) maximum concentricity of the keyway in each bore assured; (4) Built in 2 sizes. Keyways range from ⅛" to 1". High speed steel cutters stocked in all sizes; (5) the *best* keyseater of its type, yet *inexpensive*! Write now for FREE DETAILED LITERATURE!



Tilting table sets easily for tapered keyways up to 3" per foot.



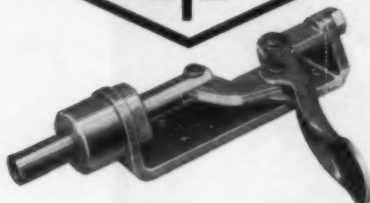
DAVIS KEYSEATER COMPANY

DIVISION OF *Kansford* MANUFACTURING CORPORATION
1237F UNIVERSITY AVE., ROCHESTER 7, NEW YORK

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YOU CAN DO BETTER WITH



TOGGLE CLAMPS

... because you can choose from over 140 models—and thirteen basic styles, or even have them adapted to your own special needs.



FOR MORE FACTS

WRITE FOR 44-PAGE
TOGGLE CLAMP CATALOG

**YOU CAN
DEPEND ON DE-STA-CO**

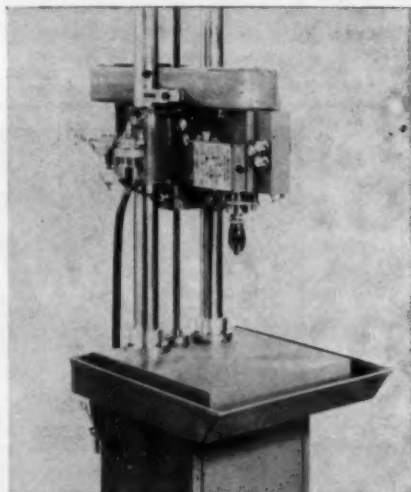
DETROIT STAMPING COMPANY

390 MIDLAND AVENUE
DETROIT 3, MICHIGAN



Vertical Drilling Machine With Automatic Controls

This single spindle vertical drilling machine is designed with a full range of automatic controls to handle the large variety of second operation drilling, tapping, countersinking, facing, reaming, hollow milling, or threading



Drilling capacity, .020" to $\frac{3}{8}$ " in mild steel.

operations on screw machine parts, die castings, stampings, headed or plastic parts. Capacity includes .020" to $\frac{3}{8}$ " drilling in mild steel and up to $\frac{3}{8}$ " tapping and $\frac{1}{2}$ " threading.

A $\frac{3}{4}$ hp spindle motor and drive pulleys provide a normal speed range between 500 and 10,000 rpm.

A top dwell unit provides adjustable pause at the top of the stroke when the unit is operated automatically, permitting time for manual loading or positioning.

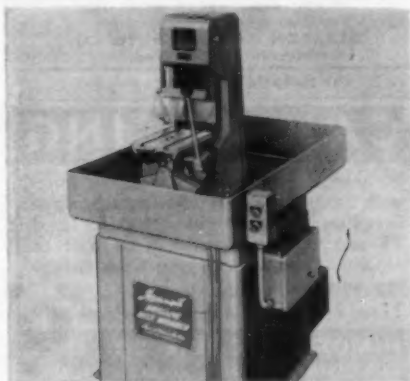
Minimum distance from spindle nose to table work surface is 0"—maximum is 24". Clearance between center line of spindles and columns is $8\frac{1}{2}$ ". The table work surface is 18" x 18".

Universal-Automatic Corp., Schiller Park, Illinois.

Use postpaid card. Circle No. 170

Manual or Semi-Automatic 6" Abrasive Belt Grinder

The Hammond Model VHP-6 abrasive belt grinder features the Hammond water-cooled-and-lubricated platen which considerably reduces friction and temperature. Various platen faces available at extra cost include chrome-faced



Model with semi-automatic oscillating-tilting table and foot-controlled air-infeed.

for manual grinding and carbide-faced for semi-automatic grinding.

Coolant splash is controlled with a modern hood, pan and sprayer. Among the many other advantages reported are that the hood door is recessed for right angle work, and the belt tracking is on the outside away from coolant and grit.

For dry, manual operation the hood has an exhaust outlet, and a DusKolector is available at extra cost. A tilting table with protractor gauge is offered for dry or wet manual operation, adjustable 15° up and 45° down. The Hammond oscillating-tilting table provides for wet, semi-automatic operation.

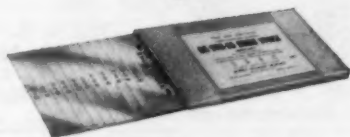
Outstanding specifications include abrasive belt (belts not furnished), 6" x 60"; abrasive belt speed, 3400 sfpm; abrasive belt working surface, 6" x 9½", and platen surface, 6" x 12½".

Hammond Machinery Builders, Inc., Kalamazoo, Michigan.

Use postpaid card. Circle No. 171



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PACKAGED PRODUCTS

SHIMSTOCK, for instance, precision rolled from selected materials. Free of burrs or rough edges in sheets or rolls. Also Feeler Stock, Arbor Spacers and Shims ready to ship.



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This new MORRISON KEYSEATER can make money for you

Install it in your shop. Its low cost will amaze you. Watch it pay for itself. You can quickly eliminate costly production tie-ups caused by waiting for expensive outside services. This is not an ordinary keyseater. The Morrison Keyseater is quality



built with machine tool accuracy. Practically anyone can operate it. It has automatic feed, automatic stop to cut off feed at given depths, automatic relief to back the work away from cutters, automatic centering, automatic lubrication. NO BUSHINGS REQUIRED. Cuts keyways 1/16" to 1". FREE new catalog 714-A shows all features and specifications can be had by writing:

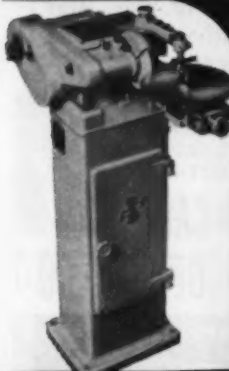
**THE D. C.
MORRISON CO.**
P.O. Box 1017C
Cincinnati 1, Ohio

Use postpaid card. Circle No. 406

TEMPO

**AUTOMATIC
SAW BLADE
GRINDING
MACHINE**

For metal cutting circular saws, high speed steel band saw blades, power hack saw blades & hole saws.



Machine generates tooth form itself. Automatic high-low triple chip adjustment. TEMPO covers the range from 3/4" to 49" saw diameter. Infinitely variable index speeds up to 200 teeth per minute.

Some open dealer territories available. High speed steel band saw butt welders now available.

W. Von Arnauld Co.

P. O. BOX 92 Pampton Lakes, N.J.
Tel. FE 7-8310

Use postpaid card. Circle No. 407



Airburr

miniature high speed
deburring and finishing
tool

Here is a small, light rotary tool for deburring and light grinding in tight places. Speeds from 30,000 to 150,000 rpm allow small wheels and burrs to operate correct surface speeds. Operates on air pressures from 10 to 100 lb./sq. in. with low air consumption.

If your dealer cannot supply you write us for further information.

ELLISON ENGINEERING CO.
4530 San Fernando Rd. Glendale 4, Calif.

Use postpaid card. Circle No. 409

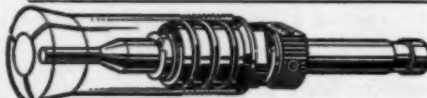
CAM MILLING

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.
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NEW! Self-Centering 5C Collet Stop

Quick friction adjustment stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles. 30 Days Free Trial. Several Territories Open for Distributors.

Write for Bulletin.

BYCO INDUSTRIES
2201 Snelling Ave. Minneapolis 4, Minn.

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"MULTI-USE" MILLING VISE SPEED, POWER, STRENGTH and ACCURACY

These requirements for high speed production milling, drilling are found in this quick opening quick return vise. Saves designing and making expensive holding fixtures. Send for Specifications and prices



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PRECISION TOOL & MANUFACTURING CO., INC.
WESTFIELD, MASS. TELE. LOGAN 8-7322

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Dial Gage Checks Internal Grooves

The Boice groove gage is a portable, compact and easy-to-adjust dial indicating gage, complete with .0005" indicator, having 2 1/4" of diameter range adjustment. It is recognized for short-run parts inspection where precision gaging is required.

Being easy-to-handle by either skilled or unskilled personnel, the gage is well suited for patrol inspection, at-the-machine checking, or with comparator stand (available) may be employed for bench inspection.

Several design variations may be adapted to this unit for solving unusual or intricate internal groove gaging problems.

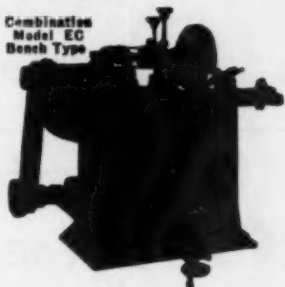
Boice Gages Inc., Hyde Park, N.Y.

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SAVE 80%

Wardwell's SAVE-A-SAW (Combination Model EC) pays for itself by sharpening only two gross of saws for you. Automatic—sharpens teeth as fine as 32 per inch.

Combination
Model EC
Bench Type



Sharpens Hack, Band and Circular Saws. Write for bulletin.

WARDWELL

3807 Ridge Rd. Cleveland 9, Ohio

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MARKING STAMPS

**MAXIMUM QUALITY
MINIMUM COST**

**50% LONGER
LIFE GUARANTEED**

Through a new and advanced process CDE Stamp Company can produce a superior stamp for ANY of your marking needs.

By combining the finest hi-speed steel and the most exacting craftsmanship we offer a stamp that will meet even the most rigid specifications.

Send your blueprint or sample of the type stamp you require and you will in turn receive a price quotation and delivery schedule that will amaze even the most skeptical.

(Purchasing agents of rated companies: A trial order at no cost upon receipt of purchase order.)



CARBIDE DIE & STAMP, INC.
2926 LACIENGA BOULEVARD CULVER CITY, CALIF.

Use postpaid card. Circle No. 413

Vernier Caliper Has Adjustable Vernier Plate



Tool makes inside, outside and root measurements of gears and threads.

No. 701 vernier caliper features an adjustable vernier plate which can be reset to compensate for wear and resurfacing of measuring faces. It makes inside, outside and root measurements of gears and threads, and can be used as a depth gage. Bottom scale of the vernier has 25 divisions reading by 1/1000ths inch. Top scale has eight divisions reading by 1/128ths ($1\frac{1}{2}$ -64ths) inch. The tool's over-all length is 8-13/16".

The Lufkin Rule Co., Saginaw, Mich.

Use postpaid card. Circle No. 140

Even without pilots or finger stops . .

"RFC" Automatic ROLL FEEDS*

**control feeding to
utmost accuracy**

REVERSES INSTANTLY

Shift Feed Finger spring from one lug hook to opposite side

CAN'T SLIP

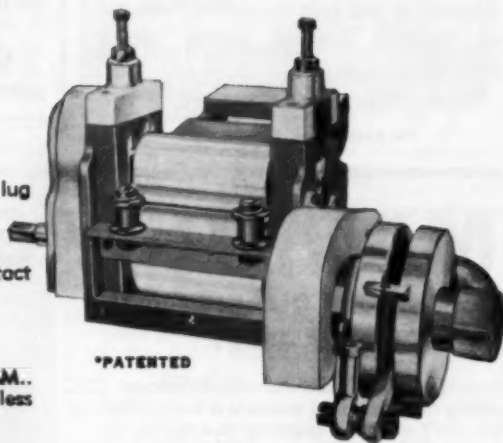
Each wedge has 4 points of contact

NO RATCHETS OR PAWLS . . .

to wear down

PATENTED CLUTCH MECHANISM..

with fewer working parts for less maintenance



Write for new brochure containing 39 standard feeds which are applicable to all METALS, FELT, CARDBOARD, PLASTICS, PAPER, WIRE, RUBBER in ALL WIDTHS, LENGTHS and THICKNESSES.

IMPORTANT: Please state make, type and tonnage of press when inquiring.



Roll Feeds Corp.

ASHTON, R. I.

MANUFACTURERS OF QUALITY FEEDS FOR POWER PRESSES

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HERE'S PROOF OF PERFORMANCE

"the spindle capacity, 'beef' of the machine, and ease of operation are really impressive..."*

RONNINGEN MANUFACTURING COMPANY



Big hole-thru-spindle capacity ($3\frac{1}{16}$ " in 17" lathe — $2\frac{1}{4}$ " in 15" lathe — $1\frac{1}{2}$ " in 13" lathe) is only one of the *plus value* features you'll find in Clausing-Colchester lathes. Here's a partial list of the many more:

- geared-head drive powered by multiple V-belts
- totally enclosed head and quick-change gear box, oil bath lubrication
- multi-splined shafts and gears
- large tapered roller bearings, with oil flow lubrication . . . most accurate bearings known to industry
- high-tensile steel spindle, hardened tapered nose
- separate rod for power feeds

- induction hardened, precision ground bed ways
- precision construction throughout to American standards of toolroom lathe accuracy.

*The result — this user report is typical: "We like everything about our Clausing lathes. The spindle capacity, 'beef' of the machine, and ease of operation are impressive. The finish we get is phenomenal. And, you just can't beat Clausing geared-head lathes for value!" Ronningen Manufacturing Company.

NO OTHER LATHE GIVES YOU SO MUCH FOR SO LITTLE!

13" cabinet base models, including motor and controls, start at \$2302; 15" cabinet base at \$3221; 17" at \$5070. You owe it to yourself to investigate Clausing-Colchester before investing in any lathe.

Write for FREE illustrated literature.



CLAUSING DIVISION

ATLAS PRESS COMPANY

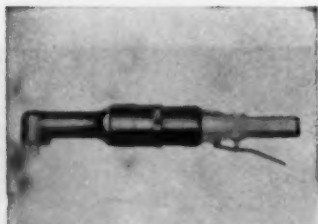
1-107 N. PITCHER ST. • KALAMAZOO, MICH.

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90° Power Wrench For Tight Spots

These non-reversible 90° angle wrenches, a recent addition to the Buckeye line of portable pneumatic tools, are of the stall-type with a 1/2" square drive spindle. Three models are offered, with speeds of 1000, 700, and 500 rpm available from Buckeye's precision vane-type air motors.

Rated bolt sizes range from 7/16" to 9/16", with torque outputs from 30 to 63 ft.lb. The largest model (500 rpm)



Three models have speeds of 1,000, 700 and 500 rpm.

is priced at \$350, weighs 9 lbs., and is 17 7/8" long, while the two smaller

At last... a simplified way to

GAGE SPLINES

*with precise
"BETWEEN-PINS"
measurement to a
fraction of .0001"*



COMTORPLUG with interchangeable expanding plugs to gage simple or special holes from 1/8" to 10" dia.

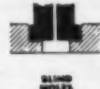
Insert into your spline or internal gear the unique expansion plug equipped with gaging wires... let it expand to firm contact... and you see the exact between-pins size shown in large graduations easily readable to a fractional tenth. For simple as well as special holes, Comtorplug's "automatic-accuracy" gaging has won a place in the production control set-ups of hundreds of fast-moving programs. *See why—request 8-page illustrated bulletin.*



SHOULDER HOLES



SHALLOW HOLES



BLIND HOLES



SPHERICAL HOLES

COMTOR CO.

62 Farwell Street, Waltham 54, Massachusetts

REQUEST BULLETIN 50 ➔





Danny DoALL says:

"Did you know

that

Demon[®]
HIGH-SPEED STEEL

Saw Bands

cut 30 times faster
and last 10 times
longer than carbon?"

Call your local DoALL STORE to learn how
to improve your band sawing operations
as much as 650% with greater accuracy,
speed and finish . . . see demonstration!

SB-69 1/4



IN STOCK
AT YOUR LOCAL DoALL STORE

THE DoALL COMPANY
DES PLAINES, ILLINOIS

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DYKEM STEEL BLUE

Stops Losses

making Dies and
Templates

Popular package
8-oz. can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few min-
utes. The dark blue background
makes the scribed lines show up in
sharp relief, prevents metal glare.
Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301G North 11th St. • St. Louis 6, Mo.

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models sell for \$305, weigh 8¼ lbs., and measure 16" long. All three have head diameters of 1¾" and a height of 2".

The company recommends 90 to 100 psi working air pressure through ¾" I.D. hose for maximum operating efficiency.

Buckeye Tools Corp., Dayton, Ohio.

Use postpaid card. Circle No. 141



Model
UL 7120

The Leading Machine
Tool Manufacturers
use

**RUTHMAN
GUSHER**

COOLANT PUMPS

THE RUTHMAN MACHINE CO.

1816 Reading Rd., Cincinnati, Ohio

Use postpaid card. Circle No. 419

Tapping Tool Features Finger Tip Control Head

New super sensitive high speed Tap-Tool features finger tip control head for precision tapping 0-80 to 4-40 holes in steel.

Control of the tapping operation is through the knurled collar

just above the tap. Light hand pressure on the collar drives the tap into the work or reverses it. Head is readily adaptable for through or bottom tapped holes. It is powered by a standard drill press.

Armite Laboratories, Los Angeles.

Use postpaid card. Circle No. 142



60-Ton Electric Hydraulic Press

The new 60-ton heavy duty electric hydraulic press is designed to meet the bending, straightening and pressing

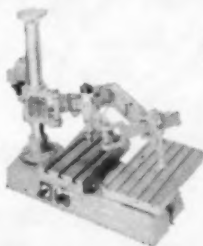
PANTO MILLER for Production Work

Write for Literature

ANTARES INSTRUMENTS INC.

55-02 37th Ave.

Woodside 77, N.Y.



Precision Type
Engraving
Marking
Profiling
Milling

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requirements of industry. Equipped with many safety innovations, its bypass valve which has been set at the factory will prevent the operator from



overloading or damaging the press.

A $7\frac{1}{8}$ " ram stroke at a ram speed of 25" per minute at zero load and 17" per minute at capacity is standard when using the press furnished with its 5 hp drive motor.

ACCO Equipment Div., American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport, Conn.

Use postpaid card. Circle No. 143



**Minimum Overhang
with this
SPRING LOADED
LIVE CENTER**

This Needle Bearing 60°
NiroL™ Center is constructed with heavy rugged spring which automatically compensates for work expansion due to heating, and avoids the continual resetting of the tail-stock. Extremely small overhang reduces vibration and chatter. Rugged, neat, compact.

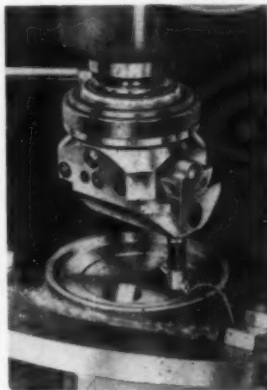
Many other outstanding features exclusive with NiroL. Get the whole story including sizes, tapers and prices by writing to:

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MANUFACTURING COMPANY
*Reg. U.S. Pat. Off. 901 Highway 22, No. Plainfield, N. J.

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MASTERHEADS

UNIVERSAL FACING AND BORING HEADS
with self-acting slide
feeds and automatic
end release



For Boring, Turning
Recessing, Undercutting,
Underfacing and Taper
Cutting

Your highest precision jobs deserve the finest and that is the

WOHLHAFTER MASTERHEAD

- Automatic Feeds
- Automatic End Release
- 9 Sizes for Work to $36\frac{1}{4}$ "
- 12 Feeds on Larger Models in increments of a 0.0008"

**THE FINEST PRECISION
UNIVERSAL HEAD BUILT**

The Sole Representative

KARL A. NEISE

Dept. MT-16, 404 4th Ave.,
New York 16, N.Y.

UNIVERSAL
FACING AND BORING



**NEISE
MODERNTOLS**



Prevents clatter of bar in feed guide.

Use of Pipe As a Feed Guide Liner

Incessant clatter of bar in the feed guide of automatic screw machines is reported as a thing of the past because of a new idea being patented by A. M. Byers Company, Pittsburgh, Pa. Use of PVC pipe or other plastic materials as a feed guide liner, like the one shown being installed in this photo, not only eliminates noise, but prevents nicking or scratching of the workpiece. The firm reports their PVC liners can be installed for as little as \$5 on single spindle machines. In some cases, PVC pipe can be used to replace the metal guide entirely.

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SECOND TO NONE FOR SECONDARY FINISHING



SCHAUER SPEED LATHES!



They're low-cost, efficient machines for polishing, deburring, lapping and other secondary finishing work on metal and plastic parts. Many models. Write for new Catalog 580.

SCHAUER
MANUFACTURING CORP.

4502 Alpine Ave., Cincinnati 42, Ohio

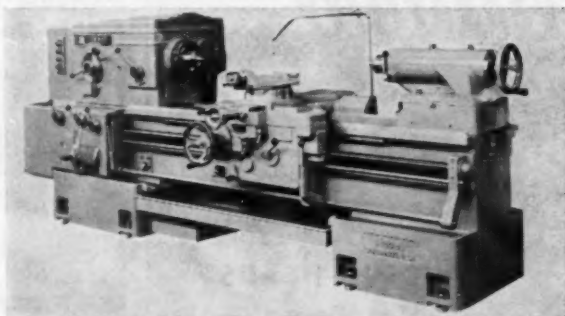
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MACHINE and TOOL BLUE BOOK

18 Gear Driven Speeds Selected From Direct Reading Index

Nebel HD 2516 heavy duty engine lathe offers precision machining capabilities for turning and facing a wide variety of heavy duty work. Eighteen gear driven speeds are selected from a direct reading color index, and controlled by two levers and color keyed speed plates. Speeds up to 1500 rpm, a new Nebel maximum, are available with selective gear design engaging only the gears required.

The heavy duty quick change box provides 60 different feeds from .0027 to .192; 60 thread changes from one to 72 threads per inch, including standard pipe threads. All are selected from a direct reading index plate. Up to 20 hp is supplied by a constant speed main drive motor.



Speeds to 1500 rpm, 60 feeds; 60 thread changes.

Heavy duty design is evident in the extra wide carriage, which has 146 sq. in. of bearing surface on the bedways to distribute tool forces for longer wear.

Automatic lubrication is provided for the headstock, quick change gear box and apron.

The Nebel Machine Tool Corp., Cincinnati, Ohio.

Use postpaid card, Circle No. 130

PRECISION HIGH COST LOW on HELIOS PRECISION VERNIER CALIPERS

Guaranteed accuracy 0.001"



Model 59DCS
Dull Chrome Finish on
Stainless Steel

Easier Reading with Double Vernier
No Strain from Glare with Dull Chrome Finish

Ask for literature on other HELIOS Calipers, Vernier and Dial, also HELIOS Parallels, Hole Gages, Telescope Gages and Radius Gages.

KARL A. NEISE

Dept. MT-16, 404 4th Ave.
New York 16, N.Y.

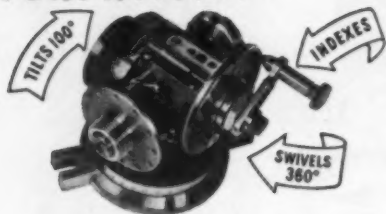
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MEASURING

Helios

NEISE
MODERNTOLS

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VERSATILITY



DIVIDING HEADS

6½" or 8" swing

Swivels in 2 planes

Holds work between centers,
in chucks and collets.

ACCURACY



5" MACHINE VISE

Plain or swivel base

Precision ground screw

V-slides with adjustable gibs

Oil hardened and ground jaws

ECONOMY

Save time and money with
Ellis tools. Write:

NICHOLS-MORRIS
CORPORATION

76-G MAMARONECK AVENUE
WHITE PLAINS, N.Y.

Use postpaid card. Circle No. 453

Portable Thread Cutter Makes Special Taps and Dies



A portable lathe-thread-miller, when attached to a 9" to 20" screw cutting engine lathe, is reported to reduce set-up time and cutting time. It is also said to increase accuracy of thread work and retain tool shape. Difficult materials which can be cut include brittle plastics and fibre glass, beryllium, tough stainless steel, and newer metals such as titanium.

The many uses include the making

**THOUSANDS
IN USE!**



- STOPS SPLASH
- CUTS MAINTENANCE COSTS

Install one and be convinced!

Melard Products, Inc. 2926 White Plains Rd.
N.Y. 67, N.Y.

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DANNEMAN Precision DIE SETS



Precision
bored on
master
plates

Catalog
on
request

DANNEMAN DIE SET DIVISION

Acme-Danneman Company, Inc.
203 Lafayette St. New York 12 • AL 5-7150

Use postpaid card. Circle No. 427

of special taps and dies (when not available)—for all tool rooms, where occasion threads are needed; for instrument shops, machine shops, etc.

Operating range is from four to 200 threads per inch. It is reported ideal for cutting multiple threads, and mills 60° Acme and square threads.

Fen-Thread Machine Co., Phila.

Use postpaid card. Circle No. 145

Pin Cabinets Offered

Special sliding-drawer steel cabinets

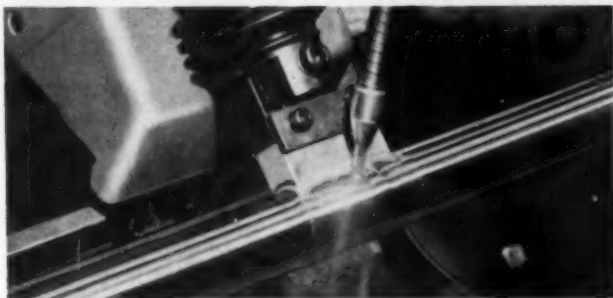
for conveniently storing Dundick deluxe precision pins are now available without cost with complete or sectional sets of the Dundick pins.

The 2" long pins are precision ground and lapped from finest quality Swedish-type tool steel, the manufacturer writes, featuring guaranteed tolerance of $\pm .00005$. Sizes range from .030 to .750 in increments of .001—a total of 721 sizes.

Dundick Tool Works, Inc., Chicago.

Use postpaid card. Circle No. 146

MICROSTONING



New! SUPFINA Produces revolutionary $\sqrt{\frac{\text{controlled}}{\text{microinch}}}$ Surface Finish!

Microstoning, by Taft-Peirce/Supfina, is an abrasive final finishing process that generates an ultra-fine, controlled microinch finish. It removes grinding flats, feed spirals and corrects geometrical errors—all at the same time.

Taft-Peirce/Supfina attachments set up quickly and easily on lathes and other machine tools. They are completely portable and no special skills are needed to operate.

Many opportunities for finishing short-cuts: elimination of surface grinding, salvaging of rejects, out-of-roundness correction. Supfina does its job extremely fast and desired finish is attained in a matter of minutes.

Save with Microstoning! Whatever your present finishing system, look into Taft-Peirce/Supfina Microstoning. Send for complete details, now!

Finish it with



TAFT-PEIRCE

SUPFINA

7 MECHANIC AVE., WOONSOCKET, R. I.

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TPP-21

Combination Bench & Pipe Vise

A new combination bench and pipe vise, with throat depth of 7½", has been designed for use by oil field machinists, pipe fitters and for general manufacturing. It has 6" jaw width, 6" pipe holding capacity and 10" opening. The same type vise is also available in 3½", 4½" and 5" jaw width size.

The pipe jaws are hogged out of solid rectangular bars of tool steel, heat treated to a hardness of 56 Rockwell C.



6" jaw width, 6" pipe holding cap.

Wilton Tool Manufacturing Co., Inc.,
Schiller Park, Ill.

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Raymac SOLID CARBIDE GRINDING TOOLS

FIRST STEP TO LOW COST BETTER WORK



When it comes to cutting labor and tool costs there is nothing like Raymac Solid Carbide Tools.

Raymac grinding tools reduce finishing time—small diameter holes can be ground without bell mouthing or surface crazing—finishes are in low micro inch range.

SOLID CARBIDE TOOL RECONDITIONING

The Second Step—keep your tools sharp—in good cutting condition. Let our engineers help set up an efficient reconditioning program for high production with low inventory of tools.

Get Details Today!

Raymac
DIVISION OF DEXCO CORP.
15490 Dale Ave., Detroit 23, Michigan

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**PRODUCE MORE
and SAVE MORE**

...with **Dickerman** **PRESS FEEDS!**

"STANDARD" DICKERMAN DIE FEED

80 strokes per minute on .030" cold rolled steel 3" wide with Dickerman 6 x 4 Die Feed.

45 strokes per minute on .030" cold rolled steel 4 1/4" wide with Dickerman 6 x 6 Die Feed.

Rugged, dependability built into every one of the 14 standard off-the-shelf feeds give 24 hour a day trouble-free performance.

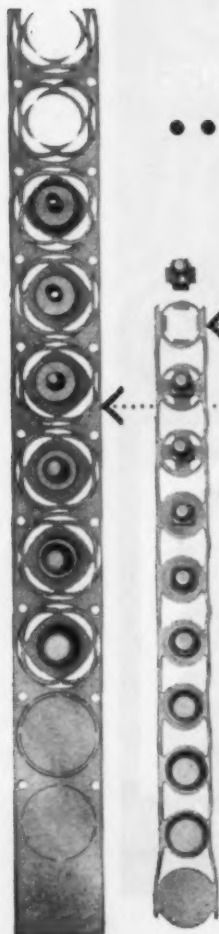
At any speed the tooling will withstand, where high precision or high production are required, Dickerman Feeds pay for themselves and then go on paying dividends over and over again. Many Dickerman feeds have performed flawlessly for over 100 million strokes.

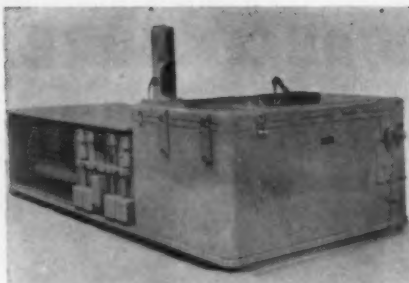
Improve your press feeding profits
—send for the Dickerman "Standard" Catalog File and prices today!

Dickerman

H. E. DICKERMAN MFG. CO.
321-333 Albany Street • Springfield, Mass.

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Chamber has a maximum low temperature of -150°F .

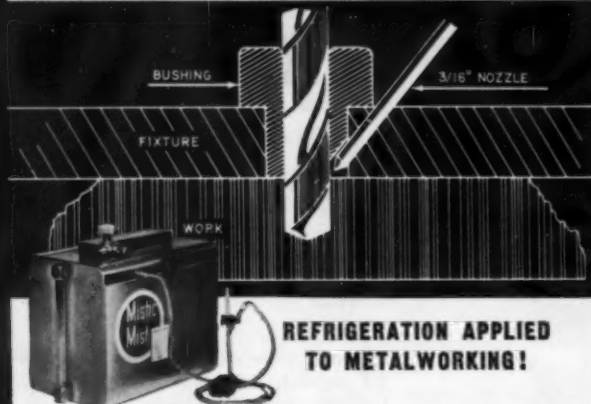
Refrigeration Equipment

This special low temperature production chilling machine, Model 7SR-120-32, is designed for stabilization of metal aircraft structures. The chamber, using a convection fluid for a more rapid uniform chill, has a maximum low temperature of -150°F and a thermal capacity of 14,000 BTu/hr at -120°F . With the pre-chilled liquid in the chamber 500 lb. of steel per hour can be chilled from ambient temperature to -110°F .

Cincinnati Sub Zero Products.

Use postpaid card. Circle No. 148

Only Mistic Mist gives you Mist Cooling thru Drill Bushings!



2RH

Here is but one of many advantages of the Mistic Mist Generator. The extremely small stainless steel nozzle provides the greatest cooling efficiency, even in hard-to-get places. It cools the tool, and not the chips! It reduces friction heat and gives better finishes at less cost. It's clean, simple, and uses any standard coolant. Learn how you can profit with Mistic Mist—for all machining operations.

Get complete information from the
"Pioneers in Mist Cooling"...

AETNA MANUFACTURING CO.

187 S. York Rd., Bensenville, Ill., PO rter 6-3810

**Mistic
Mist**

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Hydraulic Cylinders

Maximum flexibility of installation and smoother, more precise power are reported for the complete, new line of interchangeable heavy-duty high-pressure hydraulic cylinders for 2,000 psi (3000 psi-



non shock) operation. Featuring a compact 1½" bore size in its range of 12 bore sizes through 12", S-P's new hydraulic cylinders are available in 23 different mounting styles and four different rod ends.

A one-piece piston having a solid head is said to provide smoother action, and eliminate air pockets. For easy servicing, the quick-change, self-contained cartridge unit is externally removable.

The S-P Mfg. Corp., Solon, Ohio.

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how to trap dust

*that damages
your machines
and hurts
company morale*

Easy-to-move

TORIT

dust collectors trap dust
at its source!



Untrapped dust costs money: "secretly" forces precision machines out of line, limits production. Torit dust collectors are unitized for custom installation—save more money, usually more efficient than central (built-into-building) system. Torit unit operates only when machine or combination of machines it protects are on. Filtered air may be returned to room to save heat. Many models and sizes, all self-contained, easy to move. Write today to . . .

TORIT

manufacturing co.

Dept. 601, 1133 Rankin St., St. Paul 16, Minn.

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Heavy Duty Spring Tester

A new hand operated precision spring tester is used for checking the loads and deflections of large heavy duty compression and extension springs with loads up to 2500 lb. Such springs are often used in autos, trucks, tractors, guns, aircraft, railroads, elevators and industrial equipment.

A large handwheel operates a gear drive with two speeds so that one turn of the handle can move the upper com-

pression plate either $\frac{1}{4}$ " or $\frac{3}{4}$ " as desired.

To obtain the greatest accuracy, three easily interchangeable dial indicators with different load ranges are provided as follows: low range 0 to 250 lb., medium range 0 to 500 lb., high range 0 to 2500 lb., with each dial making 5 complete revolutions. Spring diameters up to 9-7/16 inches may be tested.

The Carlson Co., Oceanside, L.I.

Use postpaid card. Circle No. 149

LW CHUCKS

Real Values
in Precision
and Accuracy...



WORKING SURFACE
5 1/2" x 13" \$80.00
6 1/2" x 18" \$100.00
8" x 24" \$213.50
10 1/2" x 37" \$375.00

MAGNETIC GRIP WORK TIGHTLY
for Wet or Dry Grinding
Guaranteed waterproof.
Essentials for either
110 or 220v. D.C.

DEMAGNETIZERS

Instantly demagnetize tools or production parts. No moving parts. 100 v., 60 cy. A.C.

PLATE TYPE
MODEL S-3
7 1/2" x 12 1/2" x 6 1/2"
Ship. wt. 55 lbs. \$78.00

ROUND TYPE
3 1/4" openings
\$27.50

RECTIFIERS A.C. input 110 volts; D.C. output 110 volts. P-1 for 5 1/2" x 13" chuck 0.8 amps. \$57.50
P-2 for 6 1/2" x 18" chuck 1.0 amps. \$48.75
P-3 for 8" x 24" and 10 1/2" x 37" chuck 3.0 amps. \$87.50

DEMAGNETIZING SWITCHES For 5 1/2" x 13" and 6 1/2" x 18" sizes. \$15.00
Field discharge type for 8" x 24" and 10 1/2" x 37". \$27.00

LATHE

Heavily ribbed, semi-steel cast body. Ground face and outside diameter. Solid steel hardened and ground jaws. T Hand Wrench included.

4-JAW INDEPENDENT
4" 8" 10" 12" 14"
Reversible jaws, wide gripping surface. Tough, evenize hand-ened alloy steel screws with accurately cut square threads. Hardened alloy steel anchor bearings.

3-JAW UNIVERSAL
Guaranteed to run true for lathe or screw machine work. 6", 8" and 10" sizes come complete with two sets of accurately fitted threaded 1 1/2" x 4" (or can be furnished for use with adapter plates) and comes with one set of 3 reversible jaws. One high grade hardened steel pinion used on 5", 6", and 8", 3 on 10" size. Special alloy steel.

SEE YOUR DEALER OR
ORDER DIRECT, GIVING DEALER'S NAME



ADJUSTO-QUICK
VISE

LW

CHUCK COMPANY

23 So. St. Clair St.
Toledo 4, Ohio

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DIVIDING
HEADS



MILLING MACHINE
VISES

PRECISION **ANGULAR** SET-UPS



MAGNA-LOCK SINE makes 'em easy!

You're set-up and ready to roll in *minutes*, not hours. No fussing around with dials or scales. No complicated fixtures. Standard gauge blocks do the trick. The easy portability of the permanent magnet chuck adds to the ease of making quick set-ups.

Precision-made Magna-Lock Sine meets the precision requirements of this missile age, saves time and cuts costs. Available in single angle and compound angle magnetic and inspection plates. Table of Constants accompanies each model. Write today, Dept. BM99.

MAGNA-VISE enables magnetic chucks to hold non-magnetic materials. ASK ABOUT IT!



MAGNA-LOCK, INCORPORATED

BIG RAPIDS, MICHIGAN, U.S.A.

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For straight, circular and irregular cutting of mild steel.

Sheet & Plate Working Machine

The Pullmax Model P-7 universal sheet and plate working machine can be used for straight, circular and irregular cutting of mild steel in thicknesses up to 9/32". The machine will also do inside square cutting, slot cutting, nibbling, louver cutting, beading, joggling, edge bending, flanging and dishing.

American Pullmax Co., Chicago, Ill.

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The PUNCH WITH A

Punch

Items shown here are stock. Usual shipment within 48 hours of order receipt.

Specials made to your specifications.

Send to Dept. B for catalog.



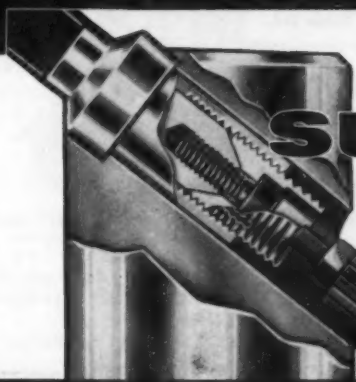
RING PUNCH & DIE

I N C O R P O R A T E D

Jamestown, New York

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*New LOW PRICES . . .
same high Quality!*



sure/bore

micrometer adjustable

**BORING BAR
CARTRIDGES**

Now from Portage Double-Quick . . .
a revised price list on the quality
SURE-BORE line of boring bar car-
tridges and accessories . . . no cut-back of
quality.

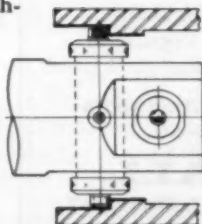
New VERSATILITY...

SURE-BORE DOUBLE FEED CARTRIDGES

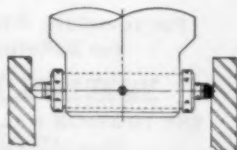


NO OTHER TOOL
can be inserted in a
boring bar as economically
as Double Feed Cartridges.

Doubles boring feeds with-
out increasing tool load.



... easily adaptable
to floating reamer as
illustrated.



WRITE for new price list

Portage Double-Quick, Inc.

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KENTRALL Hardness Testers Are Motorized

By removing major test loads automatically, the new motorized Kentralls reduce operator error, increase reproducibility of test results, and raise the productive capacity of the machine—for the same price as hand operated testers.

The motorized Kentralls are available in Combination Testers which provide both Regular and Superficial Rockwell Hardness Testing in a single machine. For those applications that do not require the additional range, Kentrall also makes single purpose testers for either Regular or Superficial testing alone.

For complete information write for Bulletin CR5-60.

KENTRALL
THE TORSION BALANCE COMPANY

Main Office and Factory:
CLIFTON, NEW JERSEY

Sales Offices: Chicago, San Francisco

TR-164

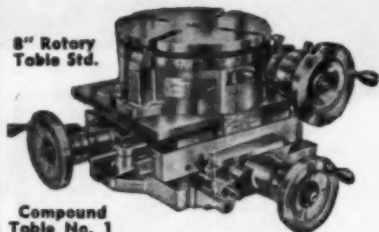
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The **STEVENS** Line

SINCE 1925

Introducing **NEW Series**

8" Rotary
Table Std.



Compound
Table No. 1

ROTARY TABLES, 5-8-12-15-18-24" sizes
both standard & dial indexing types.

ADJUSTABLE TILTING TABLES, #1-2

COMPOUND TABLES, #1-#1½-#2

ROTARY-COMPOUND TABLES #1-1½-2

INDEX CENTERS - multiple spindle

See your dealer or write for bulletins

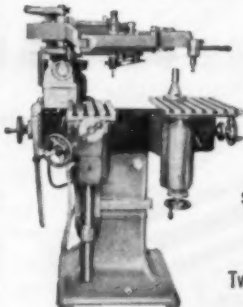
The JOHN B. STEVENS Company

SOMERSVILLE, CONN.

Use postpaid card. Circle No. 438

ALEXANDER die sinkers

for 2 or 3 dimensional
work



Latest model

No. 3A for
molds and
dies up to
1000 lbs.

Ratios from
1.5:1 to 10:1,
14 spindle

speeds from 475
to 9500 rpm,
cutters up to
¾" dia.

Two smaller sizes,
1A and 2A

Write for Catalog A
on these quality, British machines.

J. ARTHUR DEAKIN, INC.
31 ROSELAND AVE., CALDWELL, N.J.

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MACHINE and TOOL BLUE BOOK



HIGH SPEED HOLE SAW. Made of extra-tough steel, this "Moly" shatterproof saw features high speed cutting edges capable of cutting clean, round holes in materials from 9/16" in dia. to 6" in dia. It is used with portable power tools or lathes, drill presses and radial drills. Clemson Bros., Inc., Middletown, N.Y.

Use postpaid card. Circle No. 151

Air-Primed Portable Lubricator Provides One-Hand Operation

Permanently air-primed Aro-Pak Model 640-110 portable lubricator, a

grease container with a convenient length of hose and a control handle, may be loaded by the customer's present lube pump, or through use of a

Blue Devil® SOCKET SCREW PRODUCTS

****SPECIALISTS ON SOCKETS****... ARE ALL BLUE DEVIL DISTRIBUTORS

On any problem involving socket screws or their application, call in your nearby Blue Devil distributor. His well qualified experience is always at your disposal, plus complete stocks for immediate delivery.



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Sold Only Through Authorized Industrial Distributors

SAFETY SOCKET SCREW COMPANY

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Unit holds grease, has hose & control handle.

filler. Carried by a shoulder strap, the light weight unit holds 5 lb. of grease. Control handle aids in developing pressures to 7,500 psi for toughest fittings.

One-hand operation is provided for servicing any machines equipped with hydraulic grease fittings. Also, hard-to-reach fittings can be easily serviced.

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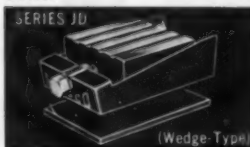
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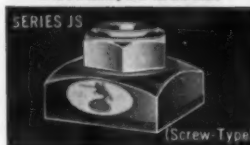
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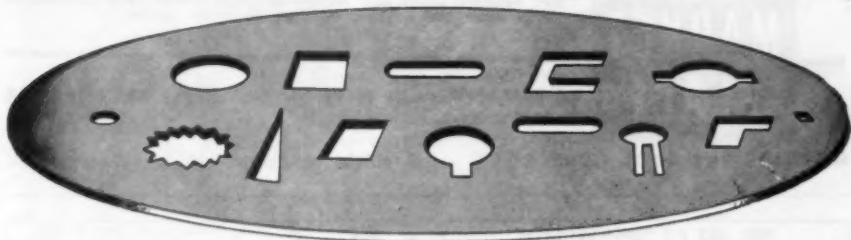
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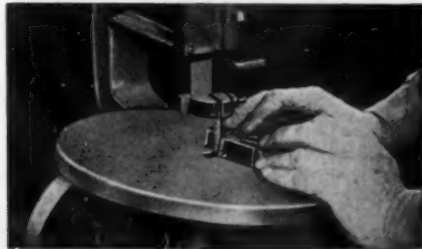
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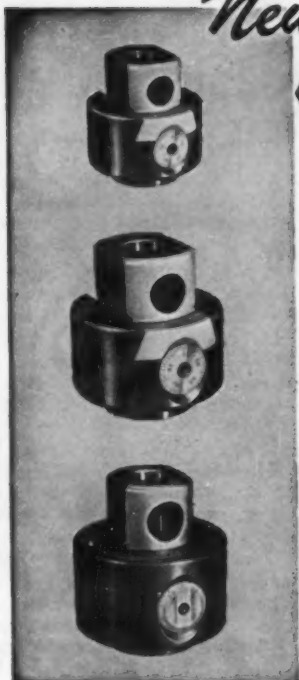
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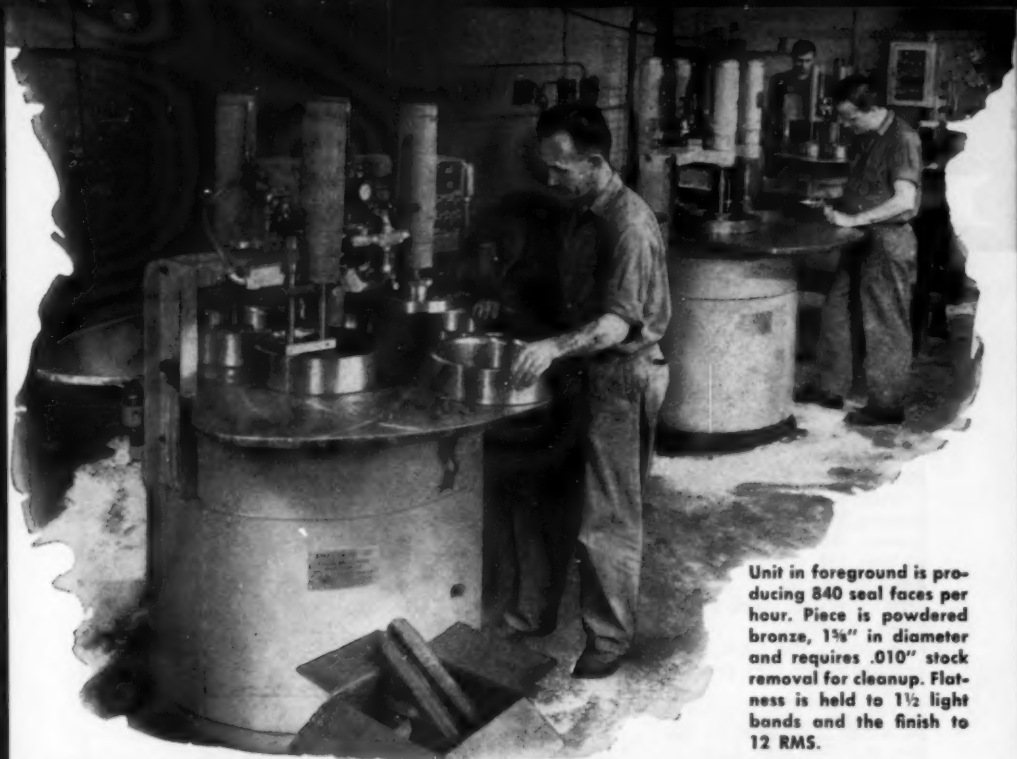
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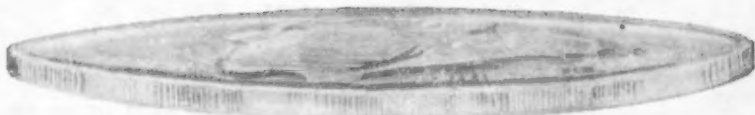
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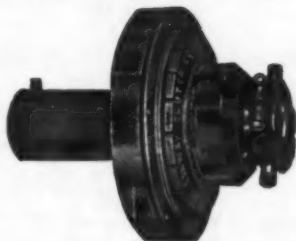
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6	9/16	I - 1/4	42.40
6	11/16	I - 1/4	46.10
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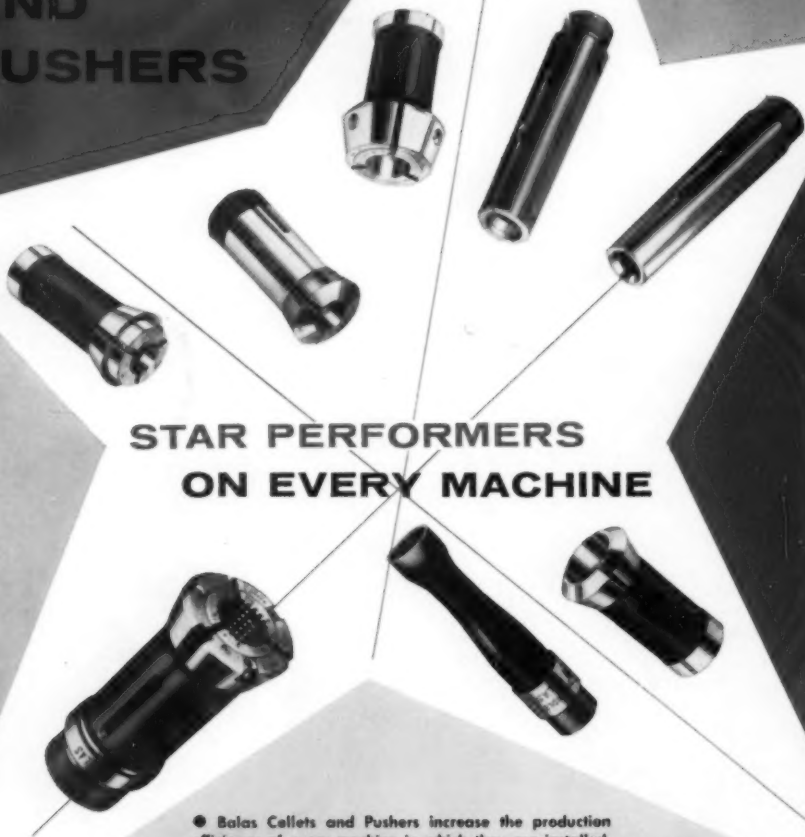
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